PERMANENT FILE
IR
LITERATURE
Return this copy to
Advertising Division
Ingersoll-Rand
Phillipsburg, New Jersey
File Oct 1953
X-1850 IR 2M 10-54
PRINTED IN U. S. A.

ssed Air Magazine

COURTESY, STANDARD OIL COMPANY OF CALIFORNIA

COUNTRY'S FIRST FILLING STATION

Forty-six Years Later, in 1953, There is One for Every 800 Residents

(SEE INDEX PAGE AND PAGE 266)

VOLUME 58 · NUMBER 10 NEW YORK • LONDON

GET CLEANER COMPRESSORS ... LOWER COSTS

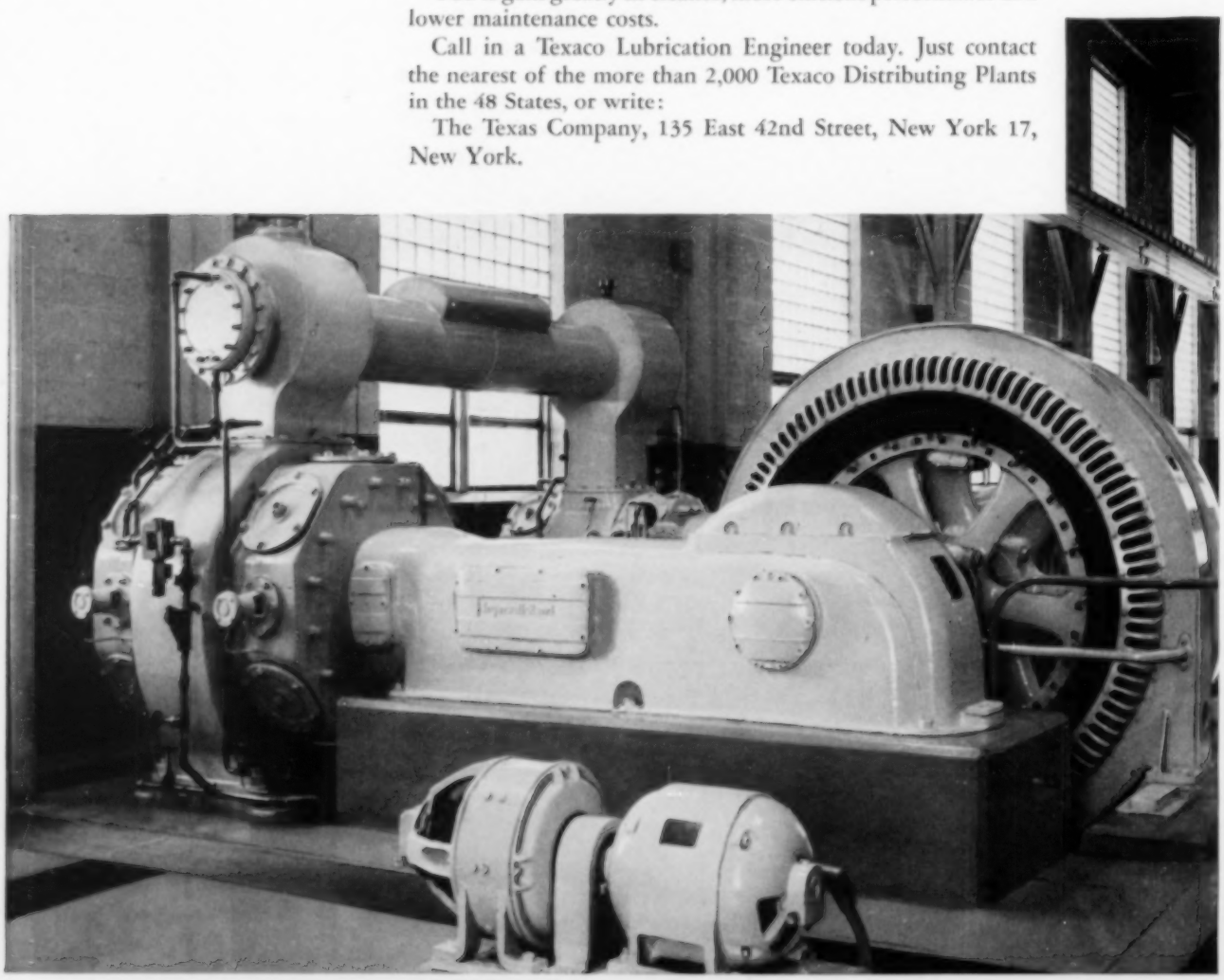
HERE'S HOW: Since *no one* oil can be equally satisfactory for *all* the various conditions under which compressors operate, Texaco offers a *complete line* of air compressor oils — covering every type and size of compressor and every operating condition.

Thus, a Texaco Lubrication Engineer can study your set-up and select for you the Texaco air compressor oil that is exactly right for your compressors and operating conditions.

You'll gain greatly in cleaner, more efficient performance and lower maintenance costs.

Call in a Texaco Lubrication Engineer today. Just contact the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, New York.



TEXACO

TEXACO Air Compressor Oils

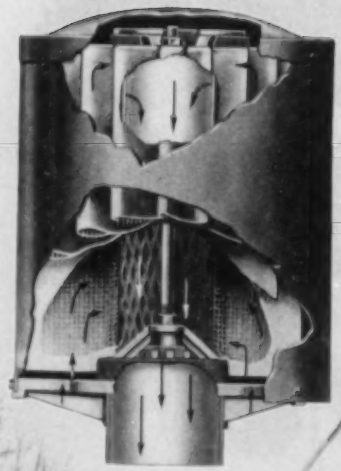
FOR ALL OPERATING CONDITIONS

STAYNEW

INTAKE FILTERS ASSURE ABRASIVE-FREE AIR

for the Ingersoll-Rand QUARRYMASTER*

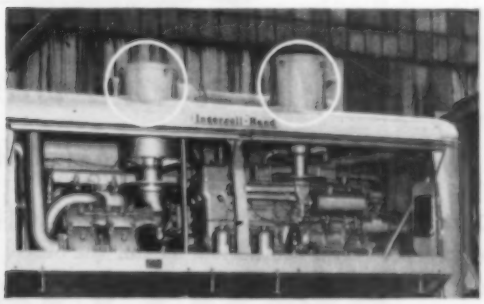
Staynew Intake Filters, standard equipment on every Ingersoll-Rand Quarrymaster, protect engines, compressors and cylinders from the abrasive material in intake air.



Staynew Filter's "positive protection" minimizes wear, keeps equipment at top efficiency longer. They are efficient over a wide range of loads and not affected by temperature changes. Dry-type filtering media removes dust particles without viscous or oily filter aids. There's no oil carry-over . . . no need for carefully held maintenance schedules. Staynew Intake Filters are easy to clean on the job.

When your air compressing equipment demands the protection Staynew Intake Filters are designed to give, specify . . . and get . . . Staynew.

CLOSE-UP of two of the four Staynew Model D Intake Filters at work protecting air intakes on an Ingersoll-Rand Quarrymaster.



*The Ingersoll-Rand Quarrymaster is a self-contained primary blast hole rig complete with drill, power plant, propulsion elements and auxiliary equipment, all mounted on tractor treads. Operating in quarries and large construction jobs in extremely dusty locations—clean intake air is a must for the diesel engine, compressor and various air motors comprising the unit. A continuous supply of abrasive-free intake air is assured by four Staynew Model D Intake Filters on every Quarrymaster.

Representatives In Principal Cities

DOLLINGER
CORPORATION
7 Centre Park Rochester 3, N. Y.

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

ANOTHER
COPPUS
"BLUE RIBBON" PRODUCT

This is the Coppus VANO. The propeller-type, best for shorter pipe lines, medium pressures.

This is the Coppus VENTAIR. A centrifugal blower, it is designed for long pipe lines, high pressures.

These are the cost-reducing Blowers that give up to 100% more air

Only Coppus makes both types — and both are made especially for *mine* ventilation. One or the other, operating under the conditions for which it is designed, delivers from 30% to 100% more air for a given power consumption than an ordinary all-purpose fan.

They can be used as blowers or exhausters and are driven either by compressed air or electric motor, with capacities up to 90,000 CFM. Like all Coppus products, these blowers wear the "Blue Ribbon" that stands for high achievement in engineering, workmanship and performance.

Representatives listed in MINING CATALOGS. Other Coppus "Blue Ribbon" products: steam turbines, gas burners, heat killers, air filters, blowers and exhausters for special purposes. See also THOMAS' REGISTER . . . Coppus Engineering Corp., Worcester 2, Mass.

COPPUS ENGINEERING CORPORATION
210 Park Avenue, Worcester 2, Mass.

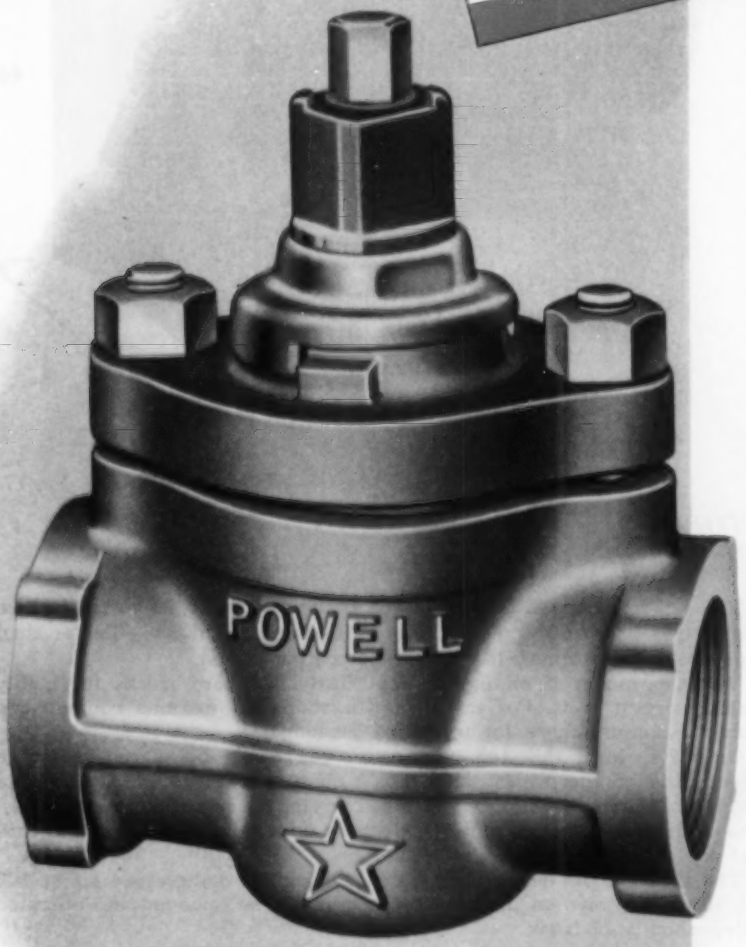
Please send ..... Bulletin 130

Name .....

Company .....

Address .....

New... and too good to miss!



Now, for the first time, lubricated plug valves that carry the Powell name and measure up to the Powell standards of precision are available in Semi-Steel and Carbon Steel.

You'll want the new PV-2 Catalog in your files. In fact, no valve file can be considered complete without it. And it's so easy to get. Just fill out the coupon below and mail. No charge, no obligation.

As you page through the catalog, you'll see the details that maintain these great new valves in the century-young Powell tradition. Features include quick and positive operation—just a quarter-turn of the Lubricated Tapered Plug to open or close. Lubricant grooves surrounding each port provide a positive seal when the valve is closed. In an open position, seating surfaces are not exposed.

Powell Lubricated Plug Valves are available with Screwed or Bolted Glands. Semi-Steel Valves are available for 175 and 200 pounds W.O.G. Carbon Steel Valves are available for 150 and 300 pounds W.P.

Powell Valves

THE WM. POWELL COMPANY • DEPENDABLE VALVES SINCE 1846 • CINCINNATI 22, OHIO

Free! SEND FOR THE PV-2 CATALOG TODAY

... it's too good to miss!

THE WM. POWELL COMPANY
2506 SPRING GROVE AVE., CINCINNATI 22, OHIO

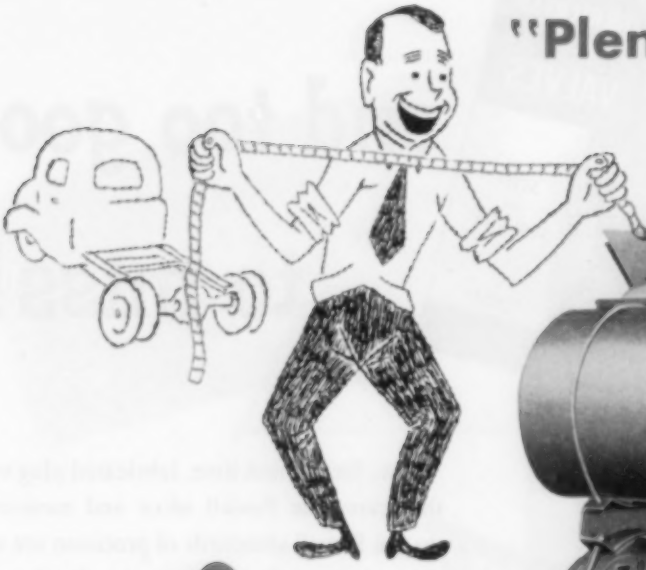
Gentlemen:

I want to bring my valve file up to date. Please send me a copy of your PV-2 Catalog on Powell Lubricated Plug Valves.

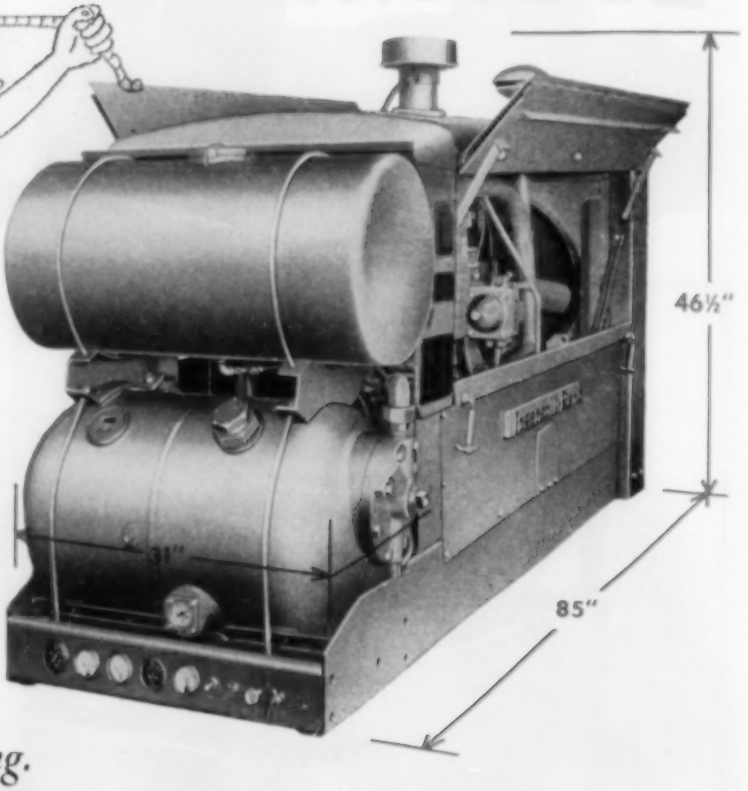
NAME_____ TITLE_____

COMPANY_____

CITY_____ ZONE_____ STATE_____



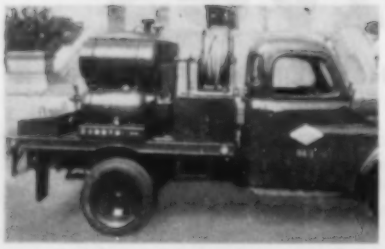
"Plenty of room left for tools and men too!"



New

GYRO-FLO ROTARY COMPRESSOR

. . . smallest, lightest, 105 cfm unit ever built for truck-mounting.



The self-contained GYRO-FLO 105 occupies a mere 70 cu ft of space and weighs only 2000 pounds. It is 51% smaller and 35% lighter than Ingersoll-Rand's former 105 cfm reciprocating model.

You can mount it on lighter, less costly, standard trucks for highly mobile service units. For traveling workshops, its extreme compactness allows maximum space for tools and personnel.

Only 7'1" long, this 105 compressor can easily be placed crosswise directly behind the driver's cab. It is built to conform readily to vehicle width limitations – with plenty of pipe carrying space available at the side. The control panel is conveniently located under the receiver at the curb end of the compressor.

The GYRO-FLO delivers full rated 105 cfm of compressed air at 100 psi. Having its own engine, the compressor can be removed and operated independently of truck.

- Other GYRO-FLO models include 105 and 210 cfm units on 2 wheel mounting, 210, 315 and 600 cfm on 4 wheels. GYRO-FLO's have no compressor valves to leak – no pistons, rings, rods or clutch to wear out. Discharge pressures are held between 100 and 110 psi throughout the entire capacity range of the machine. This means maximum efficiency in the operation of rock drills and air tools. And discharge temperatures are at least 100° lower than other compressors, assuring longer air-hose life.

There is a GYRO-FLO for your every portable compressor need – and your nearest I-R branch office will be glad to advise you on your particular problem.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

963-2

COMPRESSORS · ROCK DRILLS · AIR TOOLS · TURBO BLOWERS · CONDENSERS · CENTRIFUGAL PUMPS · DIESEL AND GAS ENGINES

He Knows!

EXPERIENCE is the truest guide to production efficiency and economy... and experience in the excavating and construction fields proves that Roebling wire rope is your one top choice for avoiding delays, cutting down replacements and saving wire rope dollars.

All over the country, large numbers of experienced wire rope users definitely prefer Roebling wire rope. Call your nearest Roebling office or distributor for a Roebling recommendation.

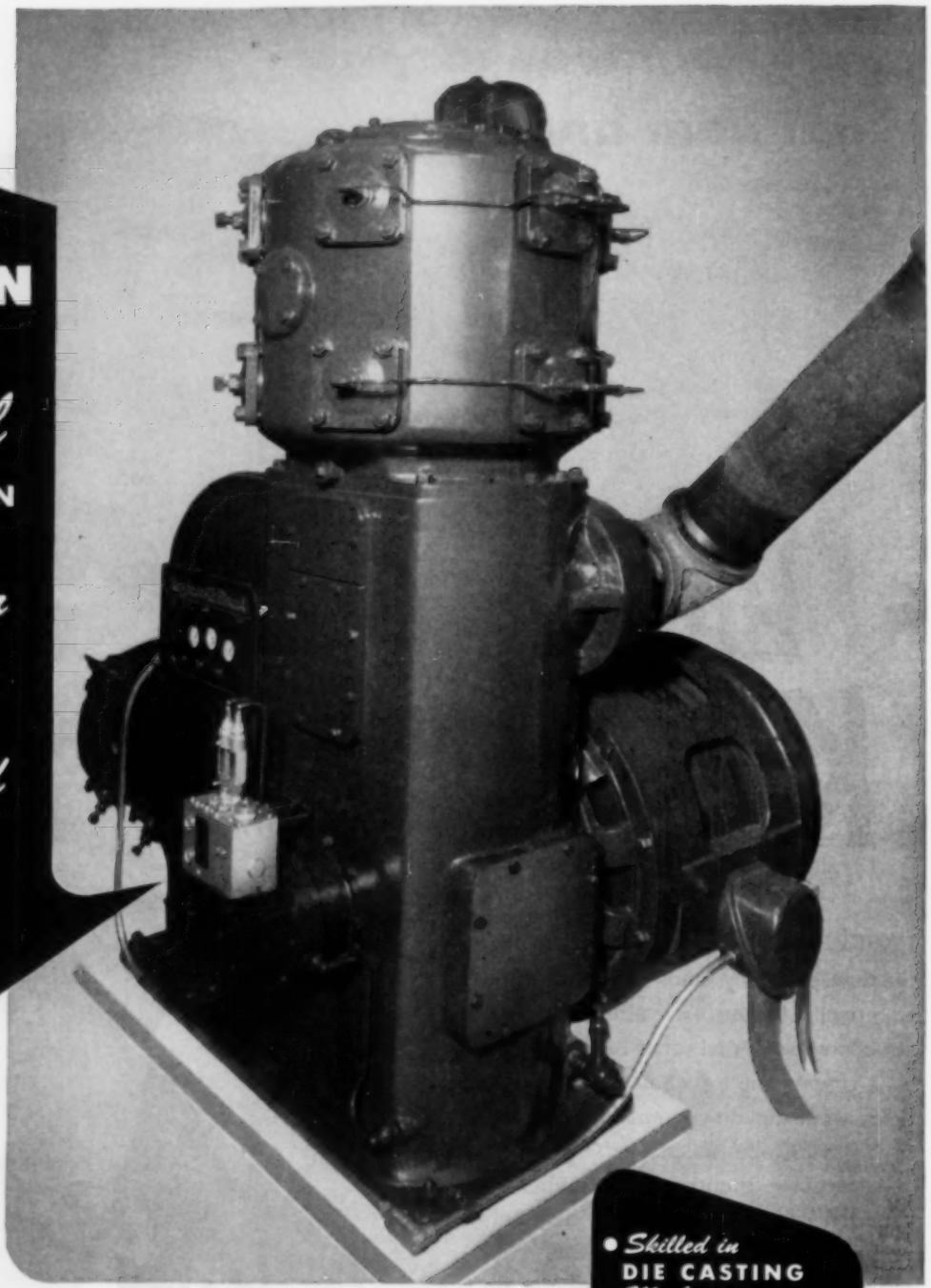
ROEBLING

A subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

MADISON -KIPP *fresh oil* LUBRICATION

fed under pressure by the measured drop!



Illustrated, the Madison-Kipp Model SVH Lubricator on an Ingersoll-Rand XLE Compressor.

- *Skilled in* DIE CASTING *Mechanics*
- *Originators of Really High Speed* AIR TOOLS
- *Experienced in* LUBRICATION *Engineering*

....STANDARD EQUIPMENT ON COMPRESSORS, WORK ENGINES AND MACHINE TOOLS....

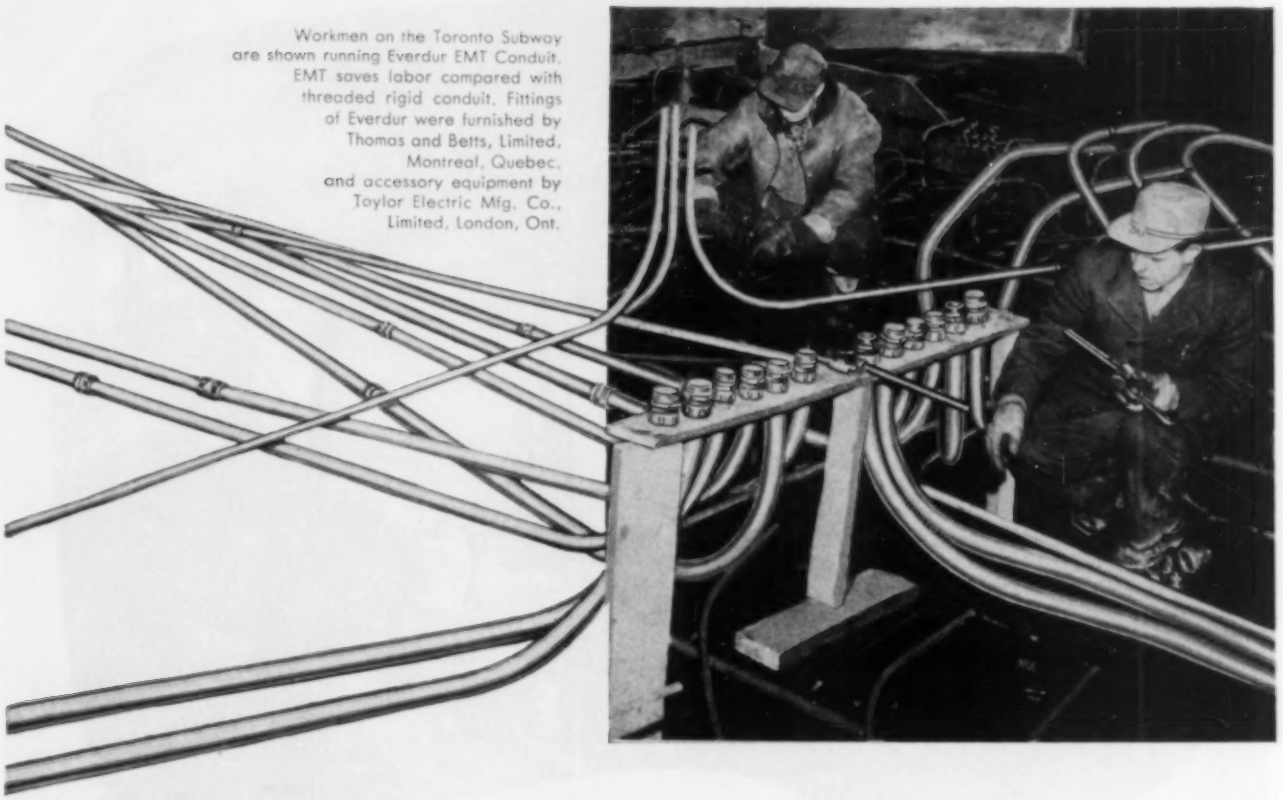
Oil under pressure fed drop by drop from a Madison-Kipp Lubricator will definitely increase the production potential for years to come when applied as original equipment on new machine tools, work engines and compressors. There are six popular models for every application. Write for special engineering data for your particular requirement.

MADISON-KIPP CORPORATION

202 WAUBESA STREET, MADISON 10, WIS., U.S.A.

ANCIENS ATELIERS GASQUY, 31 Rue du Marais, Brussels, Belgium, sole agents for Belgium, Holland, France, and Switzerland.

WM. COULTHARD & CO. Ltd., Carlisle, England, sole agents for England, most European countries, India, Australia, and New Zealand.



Workmen on the Toronto Subway are shown running Everdur EMT Conduit. EMT saves labor compared with threaded rigid conduit. Fittings of Everdur were furnished by Thomas and Betts, Limited, Montreal, Quebec, and accessory equipment by Taylor Electric Mfg. Co., Limited, London, Ont.

EVERDUR for Canada's first subway

Toronto Transportation Commission uses 158,750 feet of rustproof Everdur EMT Electrical Conduit (½" to 2") for all circuits except train power lines.

When you design a structure for a service life of from 50 to 100 years, you specify material carefully. Cost is always a factor – but cost considered in terms of long-range maintenance.

Toronto's rapid transit builders knew some of the troubles that developed in existing systems. They knew rusting could be troublesome . . . especially with electrical conduit. They considered many types . . . balanced price with durability. Their final decision was gratifying to us--Everdur* EMT for all buried conduit! Watertightness was not required. Inside the tubes, condensation would occur, whether from leakage or not. The entire system is self-draining at various outlet boxes.

Not only is all conduit Everdur-1015, but all compression fittings are made of Everdur-1000 ingot. All junctions, panels and boxes are Everdur-1010 sheet. Corrosion resistance is, of course, Everdur's strong point. But it is also nonmagnetic. And its smooth bore means easy and rapid wire pulling.

We know Toronto will never regret its choice. Since its first use twenty years ago, Everdur has consistently outlasted ordinary conduit. It is available in two wall thicknesses: rigid conduit (RC) in nominal sizes from ¼" to 4" inclusive; and the thinner-walled electrical metallic tubing (EMT) used in the Toronto Subway, in nominal sizes from ⅜" to 2".

For detailed information, uses, and specifications why not add to your reference shelf now by writing for Anaconda Publication E-12 on Everdur Conduit? The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Limited, New Toronto, Ontario. 52164A

EVERDUR – ANACONDA®

COPPER-SILICON ALLOYS

STRONG · WELDABLE · WORKABLE · CORROSION-RESISTANT

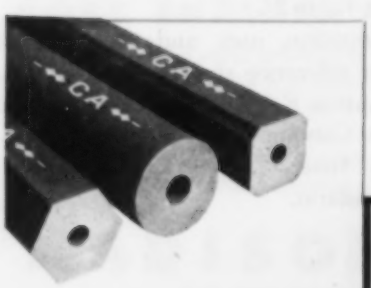
*Reg. U. S. Pat. Off.

they're using CRUCIBLE HOLLOW DRILL RODS on the Union Pacific Line Change

On this job, Crucible Hollow Drill Rods helped move 2,400,000 cubic yards of rock and make 118 major cuts. The largest cut was a huge bite 165 feet deep through solid granite.

That was the one-year record made on the 42 mile long Union Pacific Line Change, between Cheyenne and Dale Creek, Wyoming. To complete the job, largest since driving the famed golden spike joining East to West in 1869, took a combination of skill and teamwork by the Morrison-Knudsen Company . . . plus good equipment. And that's why Crucible Hollow Drill Rods were used.

Made to tool steel standards by the world's largest producer of special purpose steels, Crucible Hollow Drill Rods' *extra* quality means minimum rod breakage and fewer losses of valuable bits. You can be sure of long, uniformly dependable service, lot after lot, when you buy Crucible Hollow Drill Rods.



Visit us at Booth 241, National Metal Show, Cleveland, Ohio, October 19-23

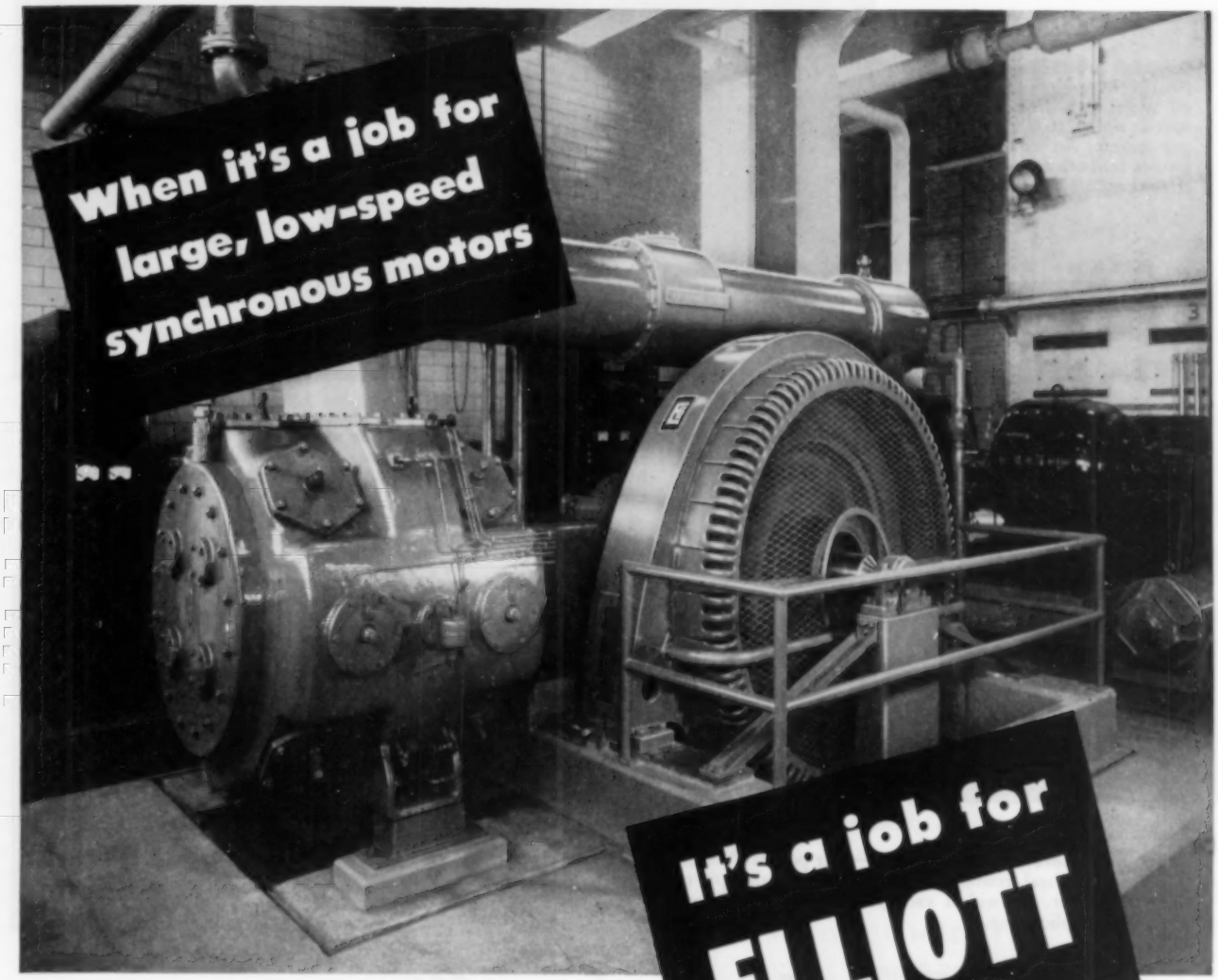
CRUCIBLE first name in special purpose steels

53 years of Fine steelmaking

HOLLOW DRILL ROD

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • ALLOY • MAX-EL MACHINERY • SPECIAL PURPOSE STEELS



Elliott 600-hp, 300-rpm, low-speed synchronous motor driving an Ingersoll-Rand compressor.

Outstanding construction features:

- Mica wrapper or tape on slot portion of stator coils for long life.
- Large area starting winding joints resistance brazed with silver alloy for strength and high electrical and thermal conductivity.
- Fine workmanship throughout.

• Like all large Elliott motors, these motors are designed to fit the installation. Starting, accelerating, pull-in and pull-out torques, power factor correction and other important factors are all tailored to the requirements. And whether open or totally-enclosed, Elliott low-speed synchronous motors may be given a number of mechanical protection, cooling and mounting arrangements. Back of this design flexibility are the built-in ruggedness and efficient operational characteristics which combine to make these motors the perfect teammate for compressors, pumps, Jordans, rolling mills, ball mills, etc. For complete details and ready reference, write to Elliott Company, Ridgway, Pa., for the low-speed Synchronous Motor Bulletin.

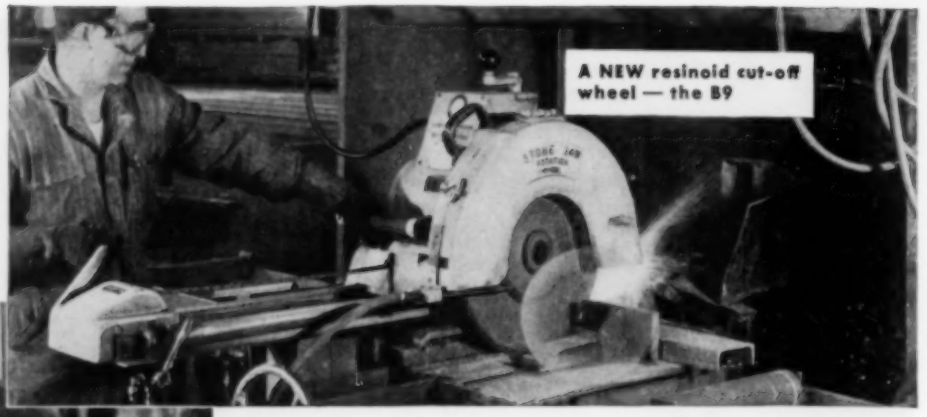
ELLIOTT Company

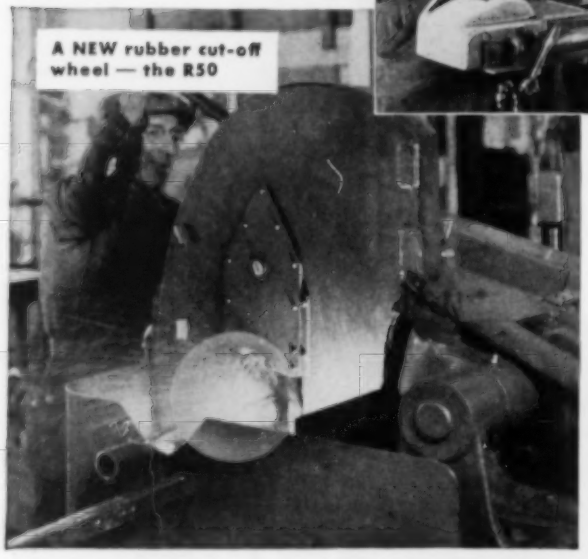
RIDGWAY DIVISION

R3—6

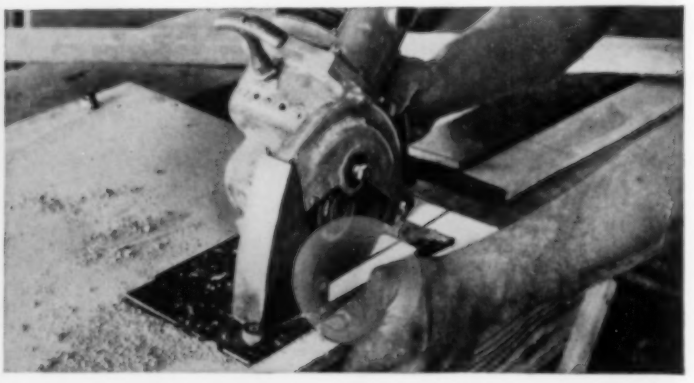
FOR MOTORS 1-200 HP: CROCKER WHEELER DIV. AMPERE, N. J.

For high production — The new Norton B9 resinoid bonded cut-off wheel cuts free and cool at speeds up to 16,000 surface feet per minute. An exceptional performer on both ferrous and non-ferrous metals. ▶





Where clearance counts — The new Norton R50 rubber bonded cut-off wheel, has the unusual advantage of built-in chip clearance. Ideal for wet-cutting of ferrous or non-ferrous bar stock, in diameters up to 6". ◀



Stronger, safer, more versatile — The popular Norton BN cut-off wheel, resinoid bonded, is used on all types of machines for the widest variety of metallic and non-metallic applications. ▶

Cost-cutters for cutting-off!

Norton wheels bring the

"TOUCH of GOLD"

to every job

Each type of cut-off wheel in the broad Norton line has individual features for top efficiency and economy in its particular job range. For example:

The new Norton B9 resinoid bonded cut-off wheel is made with either smooth sides or the rougher "F" sides for more clearance. A high production wheel, the B9 cuts free and cool, with a minimum of burning and will give you long, money-saving service in the widest range of metal-cutting applications.

The new Norton R50 cut-off wheel, rubber bonded, is designed especially for wet-cutting of bar stock up to 6" diameter. Built-in chip clearance is an advantage that helps assure freer, faster cutting with maximum service life.

Long a great favorite for metallic and non-metallic cut-off jobs, the resinoid bonded BN wheel features versatility and safety. On all types of machines — on jobs ranging from cutting tile to track slotting — the BN delivers up to six times longer wheel life, with breakage practically eliminated.

Other outstanding Norton cut-off wheels: the resinoid bonded B2, a valuable tool room wheel and also widely used on non-metallic materials; the rubber bonded R30 for small diameter work and fine slotting; and the highly durable, rubber bonded R20 that resists severest dressing action.

Ask your Norton distributor about the correct Norton cut-off wheels, in ALUNDUM* abrasive or CRYSTOLON* abrasive, for your materials and machines. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed in your classified phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

W—1517

NORTON

ABRASIVES

Making better products... to make other products better

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

ON THE COVER

THE pioneer service station for motorists pictured on our cover was little more than a lean-to, but it started a rather enduring merchandising system. Today there are more than 200,000 stations, some of them elaborate establishments that sell a long line of supplies and services, not to mention soft drinks, cigarettes, and sundry other things. In contrast, the original unit, conceived by an employee of the Standard Oil Company of California and located in Seattle, Wash., sold only gasoline and oil. A gasoline dispenser, visible in the center background, was improvised from a kitchen-type water heater equipped with a sight gauge to indicate the level of the contents. The same company now offers its diversified products and extensive list of services and conveniences through 10,000 outlets.

IN THIS ISSUE

THERE has always been a close association between automobiles and compressed air, and it is continually growing stronger. Whereas air performed the one essential service of tire inflation for early cars, its applications since then have been greatly multiplied. Many of the tools and special devices that keep modern vehicles running right and looking smart depend on air power. Page 266.

•

DYED cloth owes the consistency of its color in large part to the ease of controlling air pressure. In modern textile mills the fabric, after traveling through a liquid dye, is squeezed between rolls. If the pressure varies, so does the color, and this used to happen when the rolls were loaded mechanically. Now, with instrument-controlled air on the job, the squeeze is always uniform and so is the color of the cloth. Page 272.

•

THE threat of fire has no terrors for Ashland Oil & Refining Company since it installed an effective, automatic foam-type protection system at its pumping station in Kenova, W. Va. It uses a protein-base foam that was developed in the Navy during World War II. Page 278.

•

INTERMITTENT puffs of air have long served to blow soot accumulations off hot boiler tubes. Now the same idea has traveled down the temperature scale and is being put to work in a snow blower designed to keep railroad switches clear of obstructions in winter. Page 280.

Compressed Air Magazine

COPYRIGHT 1953 BY COMPRESSED AIR MAGAZINE COMPANY

VOLUME 58 **October, 1953** NUMBER 10

G. W. MORRISON, *Publisher*

C. H. VIVIAN, *Editor* J. W. YOUNG, *Director of Advertising*
ANNA M. HOFFMANN, *Associate Editor* J. J. KATARBA, *Business Mgr.*
J. C. PIERCE, *Assistant Editor* FRANCIS HARTMAN, *Circulation Mgr.*
A. W. LOOMIS, *Assistant Editor* WILLIAM HEINS, *Foreign Circulation Mgr.*
D. Y. MARSHALL, Europe, 243 Upper Thames St., London, E. C. 4.
F. A. MCLEAN, Canada, New Birks Building, Montreal, Quebec.

EDITORIAL CONTENTS

Keeping Your Car on the Road—*Robert J. Nemmers* 266
Air Makes a Blue Shirt Blue—*W. H. Ridley* 272
Impactools Cut Tank Erection Costs 275
Compressed Air at Work 276
Taking the Terror Out of Fire—*Robert James* 278
Pneumatic Switch Cleaner—*J. C. Pierce* 280
Detecting 'Doctored' Steel Scrap 282
Paul Bunyan Has a Rival 283
Pneumatic Press Develops 70,000 Pounds Pressure 284
Editorials—Straws in the Wind—Modern Plowman 285
This and That 286
Steering Booster Promotes Safe Driving 287
Companies Combine Instruments for Higher Efficiency 288
Air Equipment Mounts Rims and Tire Quickly 288
Industrial Notes 289
Quotes from Here and There 292
Industrial Literature 294

ADVERTISING CONTENTS

Adams Co., Inc., R. P. 27
Air-Maze Corporation 36
American Air Filter Co., Inc. 25
Anaconda Copper Mining Co. 9
Armstrong Machine Works 40
Bearium Metals Corp. 40
Bethlehem Steel Company 20, 37
Bucyrus-Erie Company 42
Canadian Ingersoll-Rand Co., Ltd. 18
Compressed Air Magazine Co. 40
Cook Mfg. Co., Inc. C. Lee 39
Coppus Engineering Corp. 4
Crucible Steel Co. of America 10
Detroit Diesel Engine Division—General Motors 45
Dollinger Corporation 3
Donaldson Co., Inc. 17
du Pont de Nemours & Co., E. I. 44
Eimco Corporation, The 29, 30
Elliott Company 11
Fluor Corporation, Ltd., The 43
Garlock Packing Company, The 14
General Electric Company 21, 22
Hansen Mfg. Co., The 41
Hercules Powder Company 35
Ingersoll-Rand Company ..... 6, 23, 38, 3rd Cover
Koppers Company, Inc. 32
Madison-Kipp Corporation 8
Maxim Silencer Co., The 26
M - B Products 36
National Forge & Ordnance Co. 31
Naylor Pipe Company 13
New Jersey Meter Company 39
Norton Company 12
Powell Valves 5
Punch-Lok Company 16
Roebling's Sons Co., J. A. 7
Sarco Company 36
Sauerman Bros., Inc. 40
SKF Industries, Inc. 19
Texas Company ..... 2nd Cover
Timken Roller Bearing Co. ..... Back Cover
Victaulic Co. of America 15
Vogt Machine Co., Henry 28
Walworth Company 24
Westinghouse Electric Corp. 33, 34
Wood's Sons Co., T. B. 39

A monthly publication devoted to the many fields of endeavor in which compressed air serves useful purposes. Founded in 1896.

CCA Member Controlled Circulation Audit

Published by Compressed Air Magazine Co., G. W. MORRISON, *President;* C. H. VIVIAN, *Vice-President;* A. W. LOOMIS, *Vice-President;* J. W. YOUNG, *Secretary-Treasurer.*
Editorial, advertising, and publication offices, Phillipsburg, N. J.
New York City Office, 11 Broadway. L. H. GEYER, *Representative.*
Annual subscription: U.S., $3.00, foreign, $3.50. Single copies, 35 cents.
COMPRESSED AIR MAGAZINE is on file in many libraries and is indexed in Industrial Arts Index and in Engineering Index.

Keeping Your Car on the Road

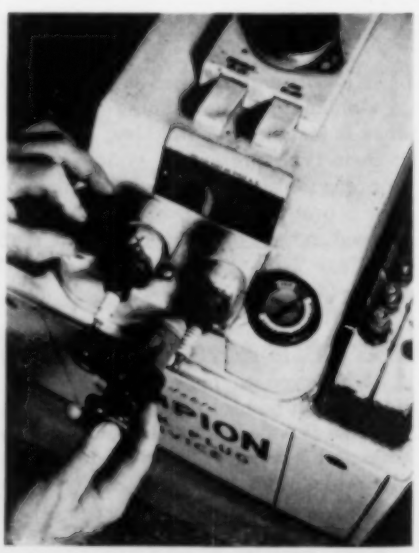
More than 200,000 Gasoline and Service Stations Minister to the Needs of U.S. Motorists

Robert J. Nemmers

IT IS reported that the first automobile "filling" station made its appearance in 1907. Prior to that time motorists bought gasoline at refineries and local general stores in 5-gallon tins. While watching a long line of impatient drivers waiting to purchase this canned fuel, an employee of the Standard Oil Company of California conceived the gasoline station. A 30-gallon tank—a refurbished water heater—was soon installed across the street from the Seattle, Wash., plant where he worked. It was equipped with a glass gallonage gauge, a hose and a simple hand valve so that gasoline could be delivered directly to the customer's tanks.

The idea mushroomed, and similar stations sprang up across the country. At first they sold only gasoline and oil, but soon began to handle car accessories, especially tires and fan belts which were among the most vulnerable parts of early autos. Tires were not the marvels of toughness then that they are now, and it was a common sight to see a perspiring, provoked and sometimes profane motorist trying to inflate a tire with a blister-raising hand-operated pump. Filling stations were naturally obliged to put in air compressors, and their owners either never gave a thought to charging for the air or figured that they could attract customers by giving it away. In any event, it helped to stamp these roadside establishments as "service" stations and made the public conscious of compressed air for the first time.

By 1952 some 200,000 stations in the United States were serving, with varying degrees of completeness, the needs of the 43,810,531 passenger cars and 9,207,897



SPARK-PLUG CLEANER

Cleaning spark plugs used to be a tedious process of scraping, filing and sanding. With the aid of compressed air the job is now done thoroughly, and the plug is also tested in a matter of seconds. The spark plug is placed in the rubber-washered hole shown at the top of the picture, and the "Abrasive Blast" key is pressed. A jet of high-pressure air then shoots hard silica sand against the working surface, removing dirt, carbon and corrosion. Next the "Air Blast" key is operated, and any adhering particles of sand or foreign material are blown away. The same machine tests spark plugs by threading them into the ports at the front, as illustrated. An electrode is swiveled into position against each plug, current is switched on, and the small dial at the left is turned, causing a blast of air to simulate actual service conditions. The operator watches the plug reflected in the polished metal mirror and notes when it ceases to fire. At that instant he checks the pressure gauge at the right, which indicates the condition of the plug.

THE OLD ORDER CHANGES

The "free air" that service stations offered their patrons not too many years ago was used almost solely for inflating tires. Today, compressed air, still free for the asking, is the power medium for many important automotive maintenance operations.

trucks that traveled the nation's highways. Some were essentially sales outlets for gasoline, oil, grease, tires, and associate supplies; others included facilities for making mechanical repairs; and here and there was one also equipped to do bodywork. In every community of appreciable size, some or all these services were available in the agencies handling the various makes of cars. But, regardless of the size or character, it would be difficult now to find an establishment that is not provided with an air compressor.

Because they had to have compressors anyway, the early stations, as well as garage operators, began to look for more and more uses for compressed air. As a result, today's list of jobs performed by this adaptable power medium in the automotive maintenance field has grown to such a length and compressed air has proved to be such an efficient helper that tire inflation is now only one of its numerous important applications.

Let's take a look, for instance, at Bob Hess, Inc., Dodge and Plymouth dealer in Lancaster, Pa. There, as at other service stations, air for charging tires is still free for the asking—and you don't even have to buy gasoline. But inside the roomy (14,400 square feet) hangarlike building where the company does all its servicing and repair work you can see compressed air performing so many tasks that it is little wonder the mechanics consider the outside tire-inflation hose almost insignificant.

In the service department are five pneumatic car lifts, three of them 2-post units that make it possible to elevate cars to whatever height may be necessary to give mechanics easy access to all underparts. The lifts, including one that is used exclusively for undercoating, are in well-nigh continual demand. The entire lubricating system is air operated: oil is pumped by air to each of the four "lube" posts and grease guns for chassis lubrication also are of the pneumatic type. Four guns can be utilized at the same time, thanks to the large air supply available.

In addition to the repair shop, Hess's maintains a small paint and body shop that is kept busy rolling out bumps, dents and ripples which always seem to appear in fenders and grilles. There, too, compressed air is much in evidence powering equipment to be described later. Two Ingersoll-Rand air-cooled, 2-stage units, each discharging at 150 psi pressure, furnish the air required for the station's myriad operations.

To protect the tools, all air lines are provided with Alemite moisture traps. Ordinarily, one compressor meets the needs of the service department; the other one those of the paint and body shop. When undercoating is being done, however, both machines are drawn upon because the spray gun by which it is applied consumes more air than any other tool commonly used in automotive shops. The Pneumatic Automotive Equipment Association reports that undercoating guns require an average of 19 cfm at 70 to 100 psi pressure, as compared with 16.5 cfm for the next largest air consumer —the air hammer such as is found in body shops. This explains why the compressors at the Hess station are interconnected by a suitable arrangement of valves. In this way it avoids closing

TIME-SAVING TOOLS

The manager of a Tulsa, Okla., service station watches (above) as a mechanic tightens cylinder-head bolts with an Ingersoll-Rand Impactool. Previously, by hand methods, a valve-grinding job in this shop took 3 hours, 20 minutes. With the power tool it has been cut to 2 hours, 25 minutes, and operator fatigue has been virtually eliminated. The mechanic shown at the right is starting to remove the cover of the rear axle housing preparatory to replacing the ring gear and pinion assembly. With hand tools, the job required 4 hours, 40 minutes; with the new power tools it takes only 3 hours, 25 minutes.

down other work while undercoating is going on.

Undercoating consists in spraying a thick, gummy compound on the underparts of a car. Generally, one application is sufficient to protect the metal for life against damaging corrosion. This is especially important in northern latitudes where many state-highway maintenance departments treat icy roads with chemicals, some of which, unfortunately, are highly corrosive and will, if picked up by moving cars, eat away metal surfaces exposed to their attack. In addition, the compound serves to lessen body noises, and for that reason the underside of the hood and trunk cover also are usually coated.

One piece of air-operated equipment at the Hess garage that invariably attracts the attention of visitors is the Walker Rocker-Jack. At the base of this unit is an air cylinder from which extends a rod that is brought in contact with the frame of the car on the lift. With each shot of grease applied, the device receives a shot of air. This rocks the vehicle, relieving pressure on the parts the grease is intended to reach. Before the introduction of this air jack, pressure on the moving parts of heavier cars and trucks was relieved by hand prying with a steel bar which often slipped, bruising knuckles and sometimes damaging the vehicle.

Hess's service department handles an average of 25 cars per 8-hour shift, the work ranging from minor jobs to major repairs and complete overhauling. To help cut down the time mechanics spend loosening and tightening nuts, it is provided with pneumatic Impactools, and the countless drilling and reaming jobs are performed by two ¼-inch Multi-Vane air drills.

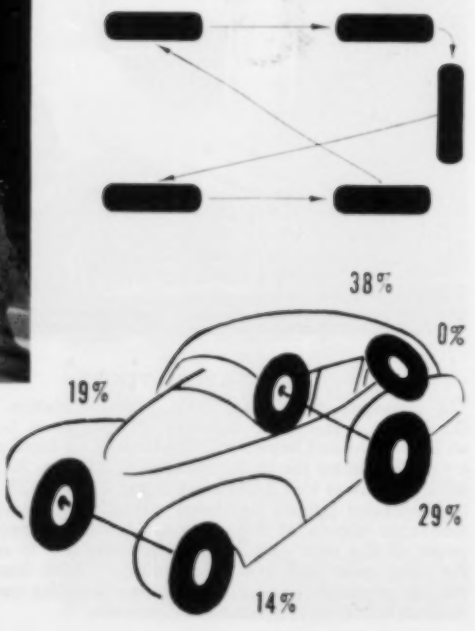
Impactools, which apply more than 2000 powerful rotary blows per minute, are especially helpful in removing frozen nuts. They are popular with the men because the torque developed is not transferred to them, and with shop owners because they are a means of increasing profits through speed of operation. Electrically powered tools with the same impact mechanism also are available, and records kept by the Midwest Chevrolet Corporation, Tulsa, Okla., show how they make it possible not only to save time and money but to improve employee and customer relations as well.

In the Midwest shop the shift from hand to power tools was started by one mechanic who bought an Impactool for his own use. When three more men followed his lead, the management went along with them: it reimbursed the four who had spent their own money and purchased twelve more, thus providing one for each of the thirteen service bays, the lubrication rack and the warehouse, as well as a spare to be kept ready for service in the stock room.

A comparison between March, 1950, and March, 1951, gives an idea of the over-all effect of the use of these new tools. Shop work, in terms of flat-rate hours, jumped from 2507 to 3254 hours, with a resultant increase in revenue of $2614.50. As the labor force remained constant (thirteen mechanics) throughout both periods, and as other service facilities were not changed, the company attributed the upward swing entirely to the Impactools. Both Midwest Chevrolet and the mechanics shared in the added income: the latter's average pay rose from $290 to $375 per month for the same number of hours worked, and the company's added profit amounted to $1509.50, or almost enough to cover the cost of the tools.

Good employee relations were indicated by the fact that the thirteen mechanics who were in the shop in 1950 were still there in 1951. This, in a field of exceptionally high labor turnover, also was credited to the Impactools not only because they enabled the men to earn more wages that combated the lure of other jobs but likewise because they reduced fatigue to a minimum. As to customer relations, motorists like the faster, better service offered by Midwest and help to advertise the garage by word of mouth.

One job on which Impactools show up to advantage is that of tire rotation, a simple method that makes it possible to increase the mileage of a set of five tires by about 40 percent. It is explained in connection with accompanying illustrations. Impactools have made the operation so much easier than it used to be that employees are sometimes observed "selling" this service to customers of their own volition. Don R. Howe, manager of Carl Grady's Richfield Service Station in Los Angeles, Calif., found this to be true. Obviously, it is good business for shop owners to provide their workers with these labor-lightening tools. Another operator, Stokes McGraw, who

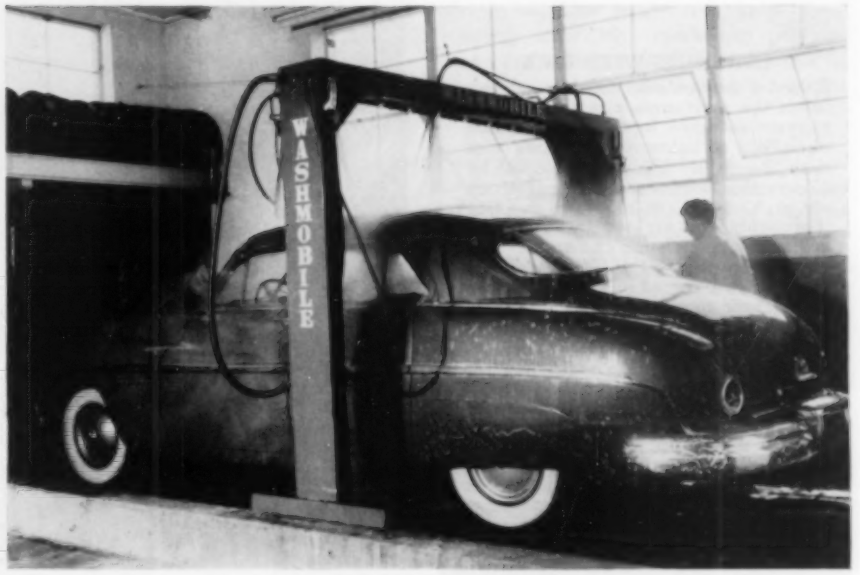


TIRE ROTATION

The bottom sketch (right) shows how wear is distributed among tires that are properly aligned. By rotating five tires instead of four, the average service life of each one is obviously extended 20 percent. Moreover, experience shows that wear on them is also equalized in consequence and that another 20 percent is added to tire life. By following the approved pattern of rotation (upper sketch), the direction a tire turns is changed every second time it is shifted. If all the work is done by hand, tire rotation takes about half an hour; when an Impactool is used to run the nuts, as illustrated above, it can be done in ten minutes.

runs a Richfield station in nearby Hollywood, estimates that an Impactool saves 75 percent of the time on tire rotation. Because his shop is called upon to do a variety of work, he uses the electrically powered model for that purpose, as well as for muffler replacement and other odd jobs.

Aside from its other increasing applications in service stations and garages, compressed air still plays a big part in the tire business, especially in connection with retreading. When a tire is brought into the Coble Tire Service in Lancaster, Pa., for example, it is first inspected by placing it on an air-operated spreader which makes it easy to see the most minute cracks and blemishes on the inside of the casing. For this purpose Coble uses a Ke-Hawke tire spreader and, to aid in handling larger tires, a hoist actuated by a pneumatic cylinder. If inspection indicates that the tire is worth retreading, it is then subjected to a series of treatments, many requiring compressed air, to give it new life.



AUTOMOBILE LAUNDROMAT

The Washmobile is an air-operated semiautomatic machine that bridges a car and directs a series of jets of water and detergent against it from both sides and overhead. The steel frame runs on tracks mounted on the floor on each side. A large stationary tank holds the water under 160 psi air pressure. An additional reservoir automatically replenishes the supply in the first one as it is used, assuring a steady volume at the jets. The detergent for the washing operation is fed from a tank that is mounted on the bridge and is also under pressure. The flow is shut off for the clear-water rinses. A hand-held nozzle serves to clean wheels and other parts out of reach of the jets. For cold-weather drying, a hose discharges compressed air to hasten evaporation. Under normal conditions, the Washmobile, manned by one employee, can wash a car in fifteen minutes, exclusive of drying time.

UNDERCOATING

Spraying a thick, gummy compound on the unpainted metal undersurfaces of automobiles reduces corrosion and subdues road noise. In the illustration, the compound is being drawn from the barrel, in the background, that is especially equipped with a unit consisting of a pump, manually controlled pressure valves, pressure gauges, a set of accumulators and hose couplings. When the unit is placed on the opened drum, a feed pipe extends down through a loosely fitting cover nearly to the bottom of it, and the pump, operated by compressed air, forces the coating up through the pipe and a hose connection to the spray gun. The accumulators, on top of the barrel, even out pulsations imparted by the pump and maintain constant pressure on the compound to keep it flowing smoothly. At the spray-gun nozzle, compressed air at about 40 psi pressure breaks up the material into relatively fine particles that are distributed uniformly on the car's undersurfaces.

First the tire is buffed to roughen the outer surface—give it "teeth"—so it will hold the special cement with which it is next coated. This is followed by rolling a strip of new rubber over the cement along the outer periphery. Then a heavy tube is placed inside the tire and inflated to facilitate handling it during subsequent operations. These involve inserting a heavy metal curing rim into the tire, putting the assembly into a molding machine, clamping it securely in place and applying steam and compressed air at 150 psi to the matrix to form the new tread. Curing time may take about 100 minutes, but depends, of course, upon the size and type of tire. The air is furnished by two Ingersoll-Rand 2-stage compressors—a 10-hp and a 5-hp unit—which are interconnected to assure an adequate supply. By taking full advantage of modern pneumatic equipment, this shop, with only eight people working 8½ hours, processes daily about 40 passenger tires and 12 truck tires.

Proper care and maintenance of the compressor plant is recognized to be a vital factor in obtaining clean and reasonably priced compressed air. Lincoln-Mercury Company at Lancaster, Pa., uses two I-R 2-stage machines, each powered by a 5-hp motor, to provide air for ten grease guns, two air-operated hydraulic hoists and for undercoating cars. The units are located in a well-lighted, well-ventilated basement, and both to protect them and the employees are surrounded by guard rails made of heavy piping that can be quickly uncoupled to give access to them. They are set to cut in at pressures 5 pounds apart—the first when the pressure in the receiver drops below 150 psi and the second when the pressure drops below 145 psi. About once a year the pressure-cut-in settings are exchanged so that each compressor will get approximately the same use over a period of time. They are lubricated and inspected at regular 2-month intervals, the dates of inspection and of oiling being entered on service tags attached in a conspicuous place on the machines.

Car washing by modern means is another service of importance to good customer relations and to station operators because of time-saving, on the one hand, and prevailing high wage rates, on the other. At the Norton Esso Station in Phillipsburg, N. J., the work is done with dispatch by what is known as a Washmobile. This ingenious machine directs high-pressure streams of water and detergent onto the car, softening up road film for easy removal with sponges. It is

CLEANING WITH RICE

Below, a service man exhibits a handful of the short-grain rice that is used to remove carbon from the combustion chambers of automobile engines with the "Head-On" blaster developed by Oldsmobile engineers. Propelled by air at 40 to 60 psi pressure, the rice thoroughly, quickly and inexpensively cleans the combustion chambers. The unit holds from 10 to 20 pounds of rice, which is forced through the lower plastic hose into the combustion chamber and drawn out by the upper hose and back into the machine. The mechanic pictured at the right has removed a spark plug from an engine cylinder and is inserting the nozzle of the blaster into the opening. By moving the nozzle tip around inside the chamber, he can attack all parts of it.

mounted on tracks and moves back and forth the length of the automobile as the job progresses. Water for the sprays is boosted to about 160 psi by compressed air in a 2-compartment tank. Operation of the fill-discharge cycle is automatic, water being drawn from the station's normal supply. The detergent is introduced into the spray system through a small hopper arrangement and automatic valve.

William Norton, owner of the station, says that the equipment has increased this phase of his business. "In the first place," to quote him, "it keeps the men dry—if it didn't we couldn't hang onto our experienced help. Next, it speeds up the process, we wash a car now in about 15 minutes as against about half an hour by handwork. And the high-pressure sprays really get the cars clean. Our customers think so, too, and on top of that the Washmobile is a real attention getter when functioning. The other day a driver from Oklahoma, in here for gas, saw a car getting cleaned up and decided to have his washed. There's been a lot of cases like that."

Another handy device at the Norton station improves the performance of the air intake filter on the carburetor. It is a Vulcan cleaner, a basinlike receptacle about 3½ feet high mounted on a small stand. In operation, a high-grade commercial solvent is poured into the basin, the filter is dropped in, a lid is fastened down, an air line is attached and a valve is opened. The air causes the solvent to "boil" up through the filter, reaching all surfaces. When the filter is clean, the air hose is removed, the solvent is drained from the receptacle, and the hose is connected to a lubricator valve. Through the action of the air the oil is atomized (much as in a pipe-line lubricator) and carried to and through the filter, coating its surfaces with a dust-trapping film.

The number of pneumatic devices used in service stations and in garages is so great that it is impossible to describe them all. There are two, however, that should be mentioned because they save considerable time and effort. One is the carbon blast by which carbon is removed from the combustion chamber of an engine without taking off the cylinder head. Engineers had long sought something of this kind because the abrasive blast previously resorted to was much too harsh for the purpose. Engineers of the Oldsmobile Division of General Motors Corporation finally came up with the answer —common household rice of the short-grain variety. It is amazingly effective in getting rid of the carbon deposits, yet there is no danger that the highly polished inner surfaces of the engine will be harmed in any way.

By the newer method, the spark plugs are removed and compressed air shoots the rice into the combustion chamber through the spark-plug holes. When the work is finished, the rice and carbon are withdrawn from the chamber through a hose by suction. Many stations treat spark plugs in a similar manner except that the abrasive in this case is silica sand. It's a much faster and a much more thorough process than laborious hand scraping. Some of these machines incorporate apparatus that determines the condition of the spark plug at the time it is being cleaned.

No story concerning compressed air in the automotive maintenance field would be complete without some mention of bodywork and painting. Although the spray gun came along in 1892, it was not used widely until the technique of mass production was introduced in automobile plants. Along with the large variety of other air-operated tools and equipment, paint-spray guns are now vitally important to body shops specializing in car repainting.

Take, for example, Roy Stauffer, Inc., garage and service station at West Pittston, Pa. Stauffer completely repaints any make of car for considerably less than is usually charged elsewhere even though he uses the highest grade of materials and first-class workmanship. The secret (if it is a secret), according to Carmen Pizzano, body-shop superintendent, lies in the fact that the organization hires the best available mechanics and makes a conscientious effort to keep them happy and contented so they will stay with the company, thus avoiding expensive labor turnover. In addition, about 95 percent of the operations in the paint shop are air-powered, thereby bringing down labor costs.

An automobile brought in for repainting is put on a production line where it is attacked by a crew of skilled body and fender mechanics, most of whom use pneumatic tools of one type or another. First, live steam is applied to remove dirt from the motor and chassis so as to prevent it from being blown back on to the painted surface. Then fender and body damage is repaired. At this stage special air-operated fender-straightening equipment is often used.

To insure a smooth surface and perfect

FENDER-STRAIGHTENING

Air-operated hammers make quick work of smoothing out rumpled fenders, their pistons striking hundreds of blows per minute. On the other side of the fender undergoing straightening is a steel anvil that backs up the hammer blows. It is held in place by the tubular steel yoke that is attached to the air end of the tool and loops around under the fender. The shop in which this picture was taken also attaches a panel-cutting device to one of its fender hammers for salvage work.

bond for the new paint, the car is chemically cleaned to remove wax, tar and road film. Then the whole surface is gone over with an air-powered block sander to take off loose paint and rust. Those areas that are inaccessible by other means are cleaned by sandblasting. To keep paint off windows and chrome fittings, they are covered with paper and masking tape. Then all crevices are blown out by use of a high-pressure air jet so that no hidden dust remains. Pits in the old finish that can't be obliterated by sanding are filled in with lead and then polished to a smoothly blended featheredge with pneumatic sanders. Bare metal is sprayed with a coat of priming paint that dries rapidly. Finally, the car is dusted with a high-pressure blowgun and wiped with a special tack rag to make sure that it is absolutely clean.

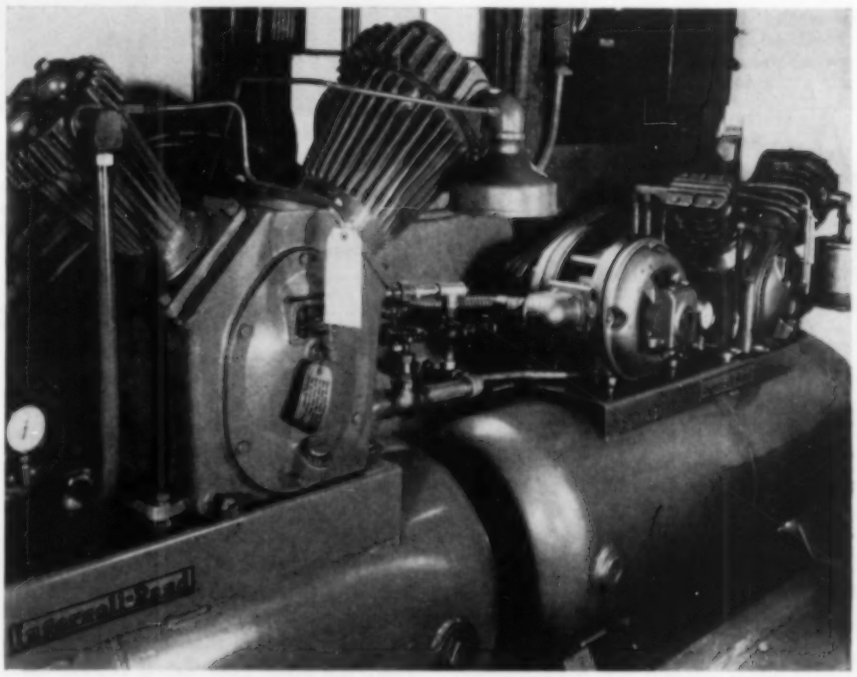
Now the vehicle is taken to an enclosed, dustproof paint booth where any remaining particles of dust are flicked off and a quick-drying enamel is applied. Stauffer's uses a factory-type spray gun that, roughly, dispenses twice as much paint as an ordinary gun. Then the car is moved into an adjacent booth housing an Auto-bake machine mounting banks of infrared lamps that bridge the body. During the baking process the Auto-bake travels slowly back and forth on tracks so that the rays penetrate the entire surface, thus insuring even, complete drying of the paint.

After the repainted car leaves the baking booth, the masking tape is quickly stripped off, the newly polished chrome fittings are replaced and, in a matter of hours, a once dull and weather-beaten vehicle emerges from the shop as bright and shiny as a new one. So well trained are Stauffer's men and so efficient are the air-powered tools used that an average of twelve cars can be reconditioned in an 8-hour shift.

Compressed air for the paint-spray operations and the other applications around the shop (Stauffer's maintains grease pits and service facilities much like those previously described) is supplied by an Ingersoll-Rand 2-stage, 15-hp Type 30 machine mounted on a 16-cubic-foot receiver. Pneumatic tools are utilized as much as possible because of their low maintenance cost and trouble-free operation, and air outlets are provided for them everywhere throughout the shop. Air-line lubricators keep them running smoothly, obviating periodic stops for oiling, and moisture traps in the lines keep condensed water vapor from reaching the tools.

A unique feature of the Stauffer establishment, which employs 50 people, is a cafeteria in the center of the shop where free lunches are served to all. And during rest periods, the men go into the cool, quiet room for a cup of coffee or a light snack. There, too, customers for the new and used cars sold by the concern can talk shop with the salesmen, or, if they wish, just loaf while waiting for their cars to be repainted, repaired or serviced.

Effective automotive maintenance revolves around the skilled mechanic who, today, is thoroughly familiar with the functioning of a car and is paid accordingly. By putting power tools into his hands to relieve him of such a tedious and time-consuming chore as hand wrenching, management permits him to apply his knowledge to more work in a given period of time. Three parties benefit: the customer, whose car is fixed faster, better and cheaper; the employee, whose wages generally go up in direct proportion to the number of jobs he performs; and the employer, whose profits rise.



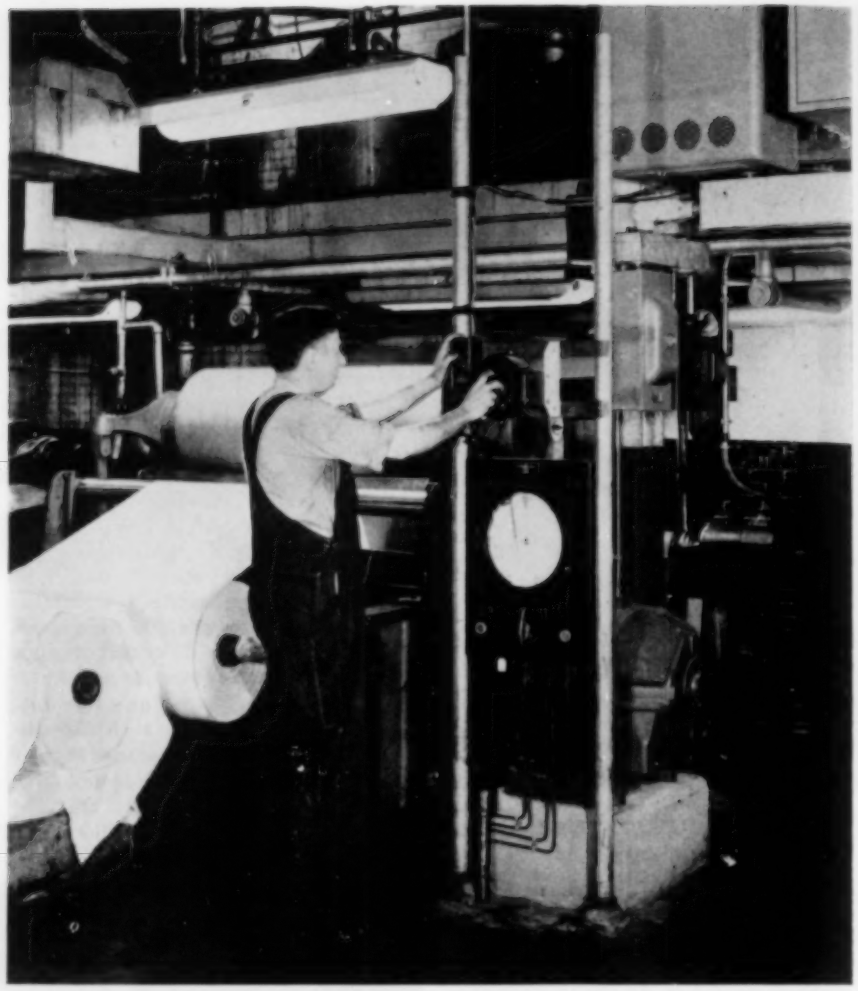
SERVICE-SHOP COMPRESSORS

The accepted compressor for gasoline filling stations is an air-cooled machine driven through V-belts by an electric motor mounted on the air receiver. Similar but larger units generally supply service shops. The two Ingersoll-Rand Type 30, 2-stage compressors pictured furnish air at 150 psi pressure for the inspection, repair and retreading operations of Coble Tire Service, Lancaster, Pa. The one on the left is a 10-hp machine; the other, a 5-hp unit. Between the two can be seen the valve connections that enable the compressors to be used singly or together, depending on the shop's varying air demands. The machines are inspected and lubricated at regular intervals, the dates being recorded on tags attached to them. A big, typical service station requires air at pressures ranging from 20 to 175 psi. The average consumption of free air differs with the tool or equipment and runs from ½ cfm for a spark-plug tester to 19 cfm for an undercoating spray gun.

Air Makes a Blue Shirt Blue

Pneumatic Roll Loading Has Made Dyeing of Fabrics Much More Accurate

W. H. Ridley*



DYE-PADDING MACHINE

After being immersed in a liquid-dye bath, the fabric is squeezed between two rolls in the background with pressure that is kept uniform by pneumatic loading and controlled at the panel shown. The picture was taken in the modern dyehouse of Riegel Textile Corporation at Ware Shoals, S. C.

AIR pressure, harnessed and controlled, is one of the powerful muscles of industry. It can push or pull, press or lift. It can exert any desired force in any desired direction, and when this power is used on roll-type machinery, the application, known as pneumatic loading, is a short cut to better, faster production.

Pneumatic loading, now common in many establishments, is standard practice in the case of most machines using squeeze rolls. But, like everything else in the industrial world, it has made great technological strides and is continuing to progress. It is interesting to examine these developments as they affect the textile industry where air loading of roll-type equipment helps mills to turn out better cloth.

Consider, for example, a man's blue cotton shirt. When the manufacturer buys his cloth from the mill, he wants the right shade in every bolt. Blue is a problem in itself—a difficult color to handle. Yet the blue must not vary from yard to yard or bolt to bolt. So, it's up to the dyehouse to produce blue cotton fabric that meets the maker's specifications and pleases the customer. To do this most dyers use the relatively new continuous process by which clean white shirting, 37 inches wide, speeds through a machine known as a dye padder.

Traveling on rollers, the material is immersed in a liquid-dye bath and then squeezed between two rolls which not only remove excess liquor but also help the dye to penetrate all the fibers. Air pressure is applied to these rolls so that the entire width of the cloth is squeezed equally. Thus the fabric retains the same percentage of dye throughout and emerges a uniform shade of blue. Moreover, the dyer cuts down rejects and saves dye and production time.

As it continues to go through the plant the cloth is subjected to chemical dips and squeezing, washing and squeezing, rinsing and squeezing and drying. These additional squeezes, while not as critical as that in the dye padder, are very important. If the dye in the chemical baths should be reduced or oxidized unevenly, the material can easily be thrown off-shade. But in each instance, carefully regulated compressed air insures the uniform squeeze which is the main color governor.

The system by which the air is directed to the rolls is a simple one. From the mill's compressor it goes to a pressure regulator and then through an air switch to cylinders or diaphragm motors that control a leverage device on the rolls. Indicating or recording instruments show the working pressure. By observing the instrument panel and adjusting the regulator the operator can automatically maintain the desired load with precision. The switch applies compressed air either to the load or the lift side of the cylinders, thus permitting the roll to be loaded or lifted pneumatically. With all the pneumatic loading controls mounted on a panel within easy reach, it is possible to make the quick adjustments necessary for high speed, continuous operation. Since thousands of yards are being dyed per day, it would be comparatively easy to spoil a large run if these controls were complicated or inaccessible.

*Textile Industries Division, The Foxboro Company, Foxboro, Mass.

The maximum loading pressure, while rarely used, may be as great as 500 pounds per linear inch of roll face (60-inch-face roll set at 15 tons). Even at the 15-ton load the pressure is usually not more than 60 psi so that the air is still compressible and will cushion the blows from seams and foreign matter passing between the rolls. Better cushioning is obtained at the customary pressure of from 30 to 40 psi, which is approximately the same as that in an automobile tire.

Having this force available, the operator can apply any loading pressure needed to obtain the proper pickup for the particular dye formula being used in the pad box. Furthermore, because each top-roll bearing is usually loaded independently, a 2-pen pressure recorder is generally utilized instead of dual indicators to register load changes and keep track of variations resulting from normal wear on equipment.

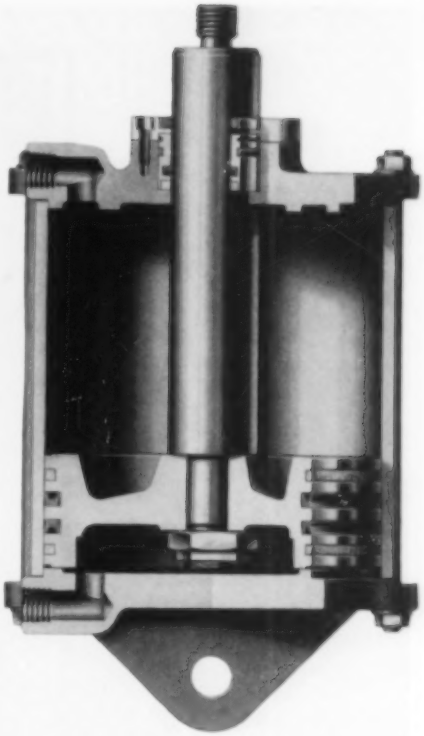
The vital element in the roll-loading system is the cylinder operator. It must be tight enough to prevent air leaks and free enough to avoid friction. If the packing is too tight, the piston cannot slide easily within the cylinder bore. Then, too, if the piston stays in one place for any length of time its "break away" may become jerky and slow—it may respond poorly to the small air-pressure changes of roll loading. Corrosion must also be considered, because excessively moist air will pit ordinary metal and destroy the cylinder.

The Foxboro Company, recognizing these special problems, undertook the job of designing a cylinder operator exclusively for roll loading. The work involved four stages of development extending over a period of fifteen years. The first cylinder, produced by Hannifin Corporation according to Foxboro specifications, had chromeplated cylinder walls, piston rods and nuts and its packing was of the adjustable type. A second model, with a honed and polished cylinder bore, further reduced friction, but the difficulty of adjusting the packing remained. This led to a third development—the leather cup type of packing which rode the smooth cylinder walls and cupped the air pressure which drove the piston. While it did overcome excessive leakage, it caused still more friction. Six months later, in 1950, these problems were solved with the Stabiload cylinder which, for the first time, provides a loading device virtually free of both friction and leakage.

The excellent performance of the Foxboro Stabiload cylinder is largely attributable to the Block V seal packing in the piston and the piston-rod packing gland. The seal is a precision-molded, continuous ring of Hycar compound (a special synthetic rubber highly resistant to oil and chemicals) with a cross section shaped like a blocked V. It is inserted in the annular grooves in the piston so that the open end of the V faces the air pressure. The rugged design of the ring is such that the air forces only the lips of the V against the cylinder walls. Thus the small area of contact between packing and walls cuts friction to a minimum, yet provides a near-perfect seal. The construction makes for a leakproof cylinder that operates with negligible wear on its components and packing.

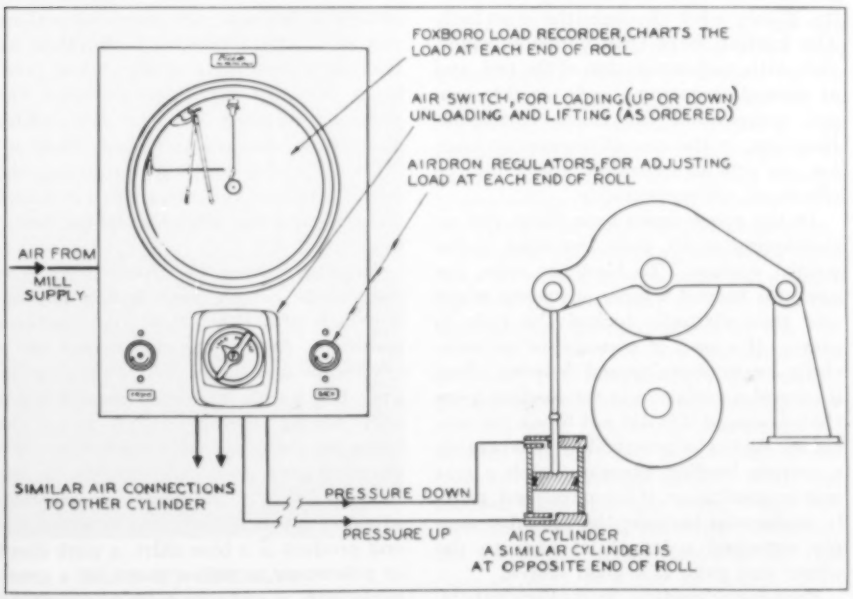
Another advance in pneumatic loading is the diaphragm air motor that serves to position a control valve. While not used to any great extent on dye padders, it is one of the basic loading devices in other phases of textile processing. The unit is connected to the compressed air supply through the customary regulator and air switch, but instead of working through a leverage system usually applies its force directly to the top roll because the length of its stroke is limited (1⅜ inches maximum, on the most popular size). It is capable of applying as much as 5 tons of loading pressure and has the added advantages of economy, low friction and no leakage. Where applicable, the diaphragm air motor is by far the most efficient roll loader.

To load the rolls, air is switched to the motors, which contain sturdy coil springs by which the top roll is suspended. The air strikes the diaphragms, thereby compressing the springs and lowering the top roll until it comes in contact with the fixed bottom roll. From that instant all air pressure is converted directly into total load, with virtually no loss through friction. And with the dead weight of the top roll nullified by the springs, actual loading starts at zero pounds. To raise the roll, the air switch is turned to "lift," air is vented from the motors and



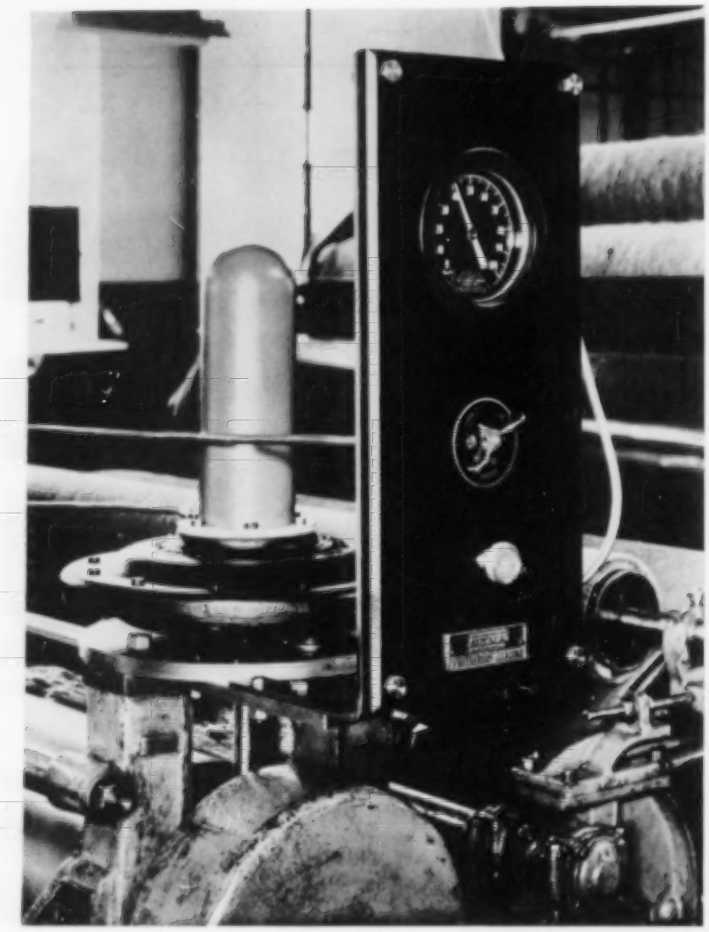
LOADING CYLINDER

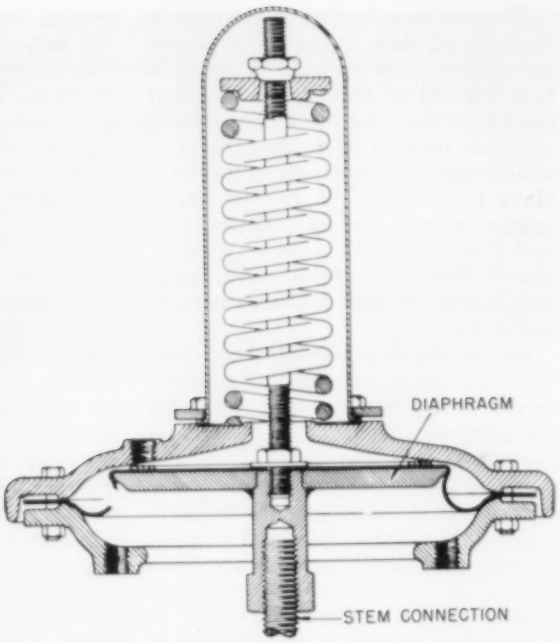
Cutaway view of a Foxboro Stabiload cylinder that applies the pressure on the padding machine pictured on the preceding page. Air enters through ports either at the top or bottom left, depending on whether the roll is to be loaded or lifted. Rings of Hycar compound of blocked V shape barely touch the cylinder walls and cup the air pressure, minimizing both leakage and friction.


FOXBORO LOAD RECORDER, CHARTS THE LOAD AT EACH END OF ROLL
AIR SWITCH, FOR LOADING (UP OR DOWN) UNLOADING AND LIFTING (AS ORDERED)
AIRDRON REGULATORS, FOR ADJUSTING LOAD AT EACH END OF ROLL
AIR FROM MILL SUPPLY
SIMILAR AIR CONNECTIONS TO OTHER CYLINDER
PRESSURE DOWN
PRESSURE UP
AIR CYLINDER
A SIMILAR CYLINDER IS AT OPPOSITE END OF ROLL

HOW ROLL LOADING WORKS

Schematic diagram of a Foxboro pneumatic system for loading the squeeze rolls of a dye-padding machine.





AIR-MOTOR LOADING

Air motors are sometimes used instead of cylinders. The picture at the left shows a Foxboro Stabilflo motor on a Peralta machine. The gauge at the top of the panel indicates the pressure applied, and the switch in the center directs the flow of the air so as to load or lift the top roll. An identical air motor is at the opposite end of the roll and the two are manifolded to keep the pressure equal. Above is a cross-sectional view of the motor. Air introduced in the bell forces the diaphragm and the connected stem down. When the air switch is turned to "lift," pressure is released and the spring raises the roll.

pressure on the coil springs is released.

Contrast this tremendous loading pressure, applied pneumatically by the flip of a finger, with the back-and-brawn loading of earlier days. Then most rolls were weight-and-lever operated, some had screw-down devices, and others a combination spring-and-hydraulic system. Each had its drawbacks, but the weight-and-lever type was the most popular. It required an operator who was both powerful and agile, and patient as well. His job was to put weights on the levers that ranged from 15 to 25 pounds and sometimes as much as 50 pounds each. There were times when the weights should have been removed, but, being accessible only from the back of the machine, were left in position even during shutdown periods. Heavy pressure, if exerted for any length of time, tended to make a flat place on the rubber covering. With air loading, the turn of a switch vents the load.

The size of the weights brought about another disadvantage, for 25 pounds, through the compound lever system, often became 400 to 500 pounds—hardly a precision adjustment. In converting such a machine to pneumatic loading, the bottom lever is generally removed and the cylinder is installed in the pull-rod. This eliminates errors caused by friction in the leverage system and permits the pressure to be adjusted in fractions of a pound instead of 25-pound steps.

There was no loading system then (nor is there one now) that prevented rolls from becoming out-of-round. After a period of service, rolls develop eccentricity, if only a few thousandths of an inch. The loading force then varies considerably with each revolution of the roll, and at normal operating speeds weights cannot compensate for these variations. However, in the case of pneumatic loading, air acts as a cushion, absorbing the effects of roll eccentricity.

In the screw-down type there was no cushioning at all, even less than in the weight system. To load the rolls, the operator turned a large adjusting wheel and thus virtually locked the rolls in place. If a wad of material or an especially heavy seam passed between them it caused a variation in the loading force that damaged if it did not break the machine. As to the practicality of repeating a certain loading pressure, such a feat was impossible or, if accomplished, purely accidental because the operator simply attached a length of pipe to the wheel and gave it a good heave.

Pneumatic loading, by its very nature, presents none of these difficulties. Rolls are instantly loaded or unloaded from the switches at the panel, the operator remaining a safe distance from equipment and fluids. Adjustment is precise; dye penetration accurately controlled. Pressure at either end of the roll can be increased to compensate for drive gears or any other causes of inequality in the "nip." Uniform dyeing is easily obtained, because any previous setting can be exactly reproduced. Further, by making it possible to apply greater pressures than by the older methods, the pneumatic system lets the dye padder operate at stepped-up speed, thus increasing production and permitting the use of a higher dye concentration to get the same pickup with less water carry-over.

Emerging from the final drier, our once white cotton cloth is now the exact shade of blue the shirt manufacturer specified. As we have discovered, air is the means and the muscle, powering the firm but gentle squeezes required not only during dyeing but all along the route as cotton is converted from raw fibers to gray goods and, finally, to the finished fabric. As many as 100 such squeezes are involved, and whether the end product is a blue shirt, a pink sheet or pillowcase, a yellow towel, or a green tablecloth, it owes its color to improved chemicals and machine design, dyehouse skill, and the scientific application of compressed air.

Impactools Cut Tank Erection Costs

THE use of Impactools by Mill & Elevator Service Company in the erection of bolted steel tanks for grain storage has cut 150 man-hours from the average job and saved the Des Moines, Iowa, firm more than $7000 in the construction of 25 such tanks. The latter range in diameter from 9 to 38 feet and rise to a height of 56 feet, the average being 21 feet in diameter and 48 feet high. All, regardless of size, are built of standard 7- to 14-gauge steel sheets measuring 4½x8 feet. These are fastened together with bolts—48 vertically in each section and 30 circumferentially, making a total of some 9000 bolts on the average tank. These bins are frequently owned by the Government and are used to store grain delivered to it by farmers in repayment of price support loans.

When the company was organized in 1948 it was standard practice to do the work with hand ratchet wrenches. That was a slow fatiguing procedure, and it was observed that nuts run at the end of a day were inevitably not as tight as those applied early in the morning when the operators were fresher. There was, however, some skepticism about the use of power tools because they would have to be light enough to be easily handled on ladders and scaffolds and still sufficiently sturdy to run nuts steadily ten hours a day.

Then in 1949 the concern put an Ingersoll-Rand Size 4-U electric Impactool on the job. Of lightweight—6 pounds 8 ounces—it ran the nuts on without transmitting torque or twist to the worker, a feature made possible by the impact mechanism which spins the nuts on until it meets a certain resistance and then tightens them with more than 2000 hard rotary blows a minute. A similar tool, the Size 504 air-powered Impactool which weighs only 5 pounds 12 ounces, has been used for like applications.

In erecting the tanks, a reinforced-concrete foundation is first poured and then a gin pole is raised to hoist the steel sheets. To start the aboveground operations, two sheets are hand-winched into position, and while they are held by two men a third inserts a few bolts to keep them in place. The vertical edges of the sheets have an overlap with a channel stiffener on the inside. After a full ring has been set up in this way, the workers go back and put bolts in the remaining holes. One on the inside of the bin inserts the ½-inch-diameter bolts, and another on the outside starts the nuts and runs them up lightly with an Impactool. They are left slightly loose to permit a reasonable amount of "give" for the assembly of the next lift in the same manner, scaffolding being raised as height increases.

The sheets in succeeding circular sections are arranged so that the vertical joints do not coincide. The rings are fastened to one another by bolts that pass through chimes or flanges on the edges of the plates and can therefore be placed by only one man. When a tank has attained a height of three rings, or 24 feet, a man starts at the bottom with an Impactool and tightens all the nuts, moving upward as construction progresses.

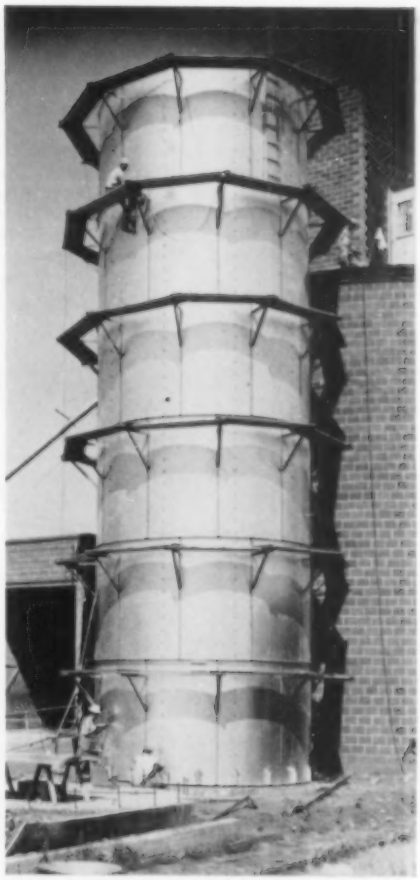
Because the company originally used hand wrenches, it is possible to compare the two methods and to arrive at the time savings brought about by the Impactools. (The firm now has three Size 4-U and two heavier-duty 8-U tools.) By the old procedure, bolt-placing, nut-starting and tightening operations required, roughly, 250 man-hours in the case of the average tank. With the modern tools this has been cut to 100 man-hours, or by 60 percent. Currently, the wage rate in the Midwest for this class of work is $1.90 an hour. Consequently, the labor saving means a reduction of $285, or approximately twice the cost of one of the tools. At the time the foregoing data was compiled, 25 tanks had been erected at a saving of more than $7000.

One notable job contracted by the company was the building at Muscatine, Iowa, of a 53,000-bushel tank 38 feet in diameter and 56 feet high. It is believed to be the largest grain bin in the state and called for the staggering total of 19,000 bolts to hold the sheets together. The work of inserting the bolts, starting the nuts and tightening them—once loosely and the second time to draw them up tight—involved around 200 man-hours. Based on prior experience, Mill & Elevator Service management estimates that it would have taken a minimum of 500 man-hours to do the job with hand tools.

The Impactools are well-nigh in continual operation throughout the daily 10-hour shift, yet company officials report that maintenance is moderate. According to Dale Cloud, president of the firm, there are several advantages to the use of Impactools. They insure customers faster service and better, tighter tanks. In addition, they enable the employees to handle a greater volume of work while not only paying for themselves but also returning an appreciable profit to the company.

EASY TO OPERATE

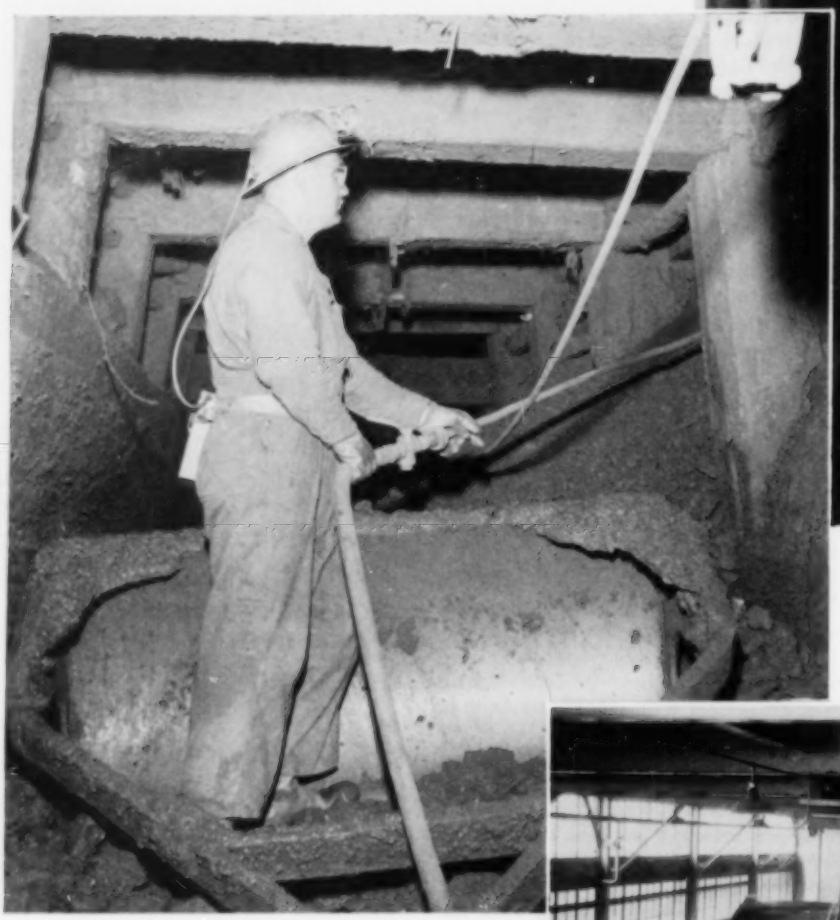
Where men work a 10-hour shift on ladders and scaffolding the lightweight tools are much appreciated. Impactools operate equally well in a horizontal or vertical position, as shown here.



NEARING COMPLETION

This storage tank is 15 feet in diameter and 48 feet high and is put together with about 6000 bolts. The use of Impactools has cut the man-hours required for assembly from 175 to 70.

Thanks to his special clothing, the man pictured at the right is fairly comfortable working in a temperature of around 400 F between two gas-fired furnaces in the Belleville, N. J., factory of Walter Kidde & Company, Inc. The suit and hood are made of a pliable herringbone-type fabric coated with aluminum that reflects, it is claimed, 90 percent of the heat. The gloves can withstand 1600 degrees, and the shoes are of asbestos. Air required for breathing and cooling is taken from the plant line and fed through the hose connection to the windowed mask after passing through a purifier and pressure reducer.



COMPRESSED AIR A

Materials that tend to cling or clog can often be freed and made to flow by injecting compressed air into them and between them and the surfaces to which they are adhering. The picture above shows an air lance being used to loosen iron ore in a chute that feeds the scraper on which the trammer, Stanley Bors, is standing. The scene is underground in the Buck Mine of the Verona Mining Company at Caspian, Mich.

A switching station on a conveyor system in a southern factory is pictured at the right with the goods, in this setup, traveling toward the back. The operator can move the roller section to connect with any one of the three extensions shown merely by operating a lever. The switch section is shifted by cylinders actuated by air at 80 psi pressure. The device is manufactured by Alvey Conveyor Manufacturing Company, St. Louis, Mo.

R AT WORK

At the Barrows Porcelain Enamel Company, Cincinnati, Ohio, pipe that has been glass-coated inside and out is bent at angles up to 45° in the machine pictured above. The required pressure is exerted by the piston of the air cylinder at the lower-right, and the pipe is heated to 1500°F just before it is applied. The glass-lined piping is used for handling corrosive liquids.

●

Aluminum-framed, double-glazed windows in the new Alcoa Building in Pittsburgh, Pa., are made tight-fitting by an inflatable butyl-rubber tube running around the outer edge. Each window pivots on a vertical axis and can therefore be reversed for cleaning from inside the structure. The picture shows a girl inserting a tool to deflate the gasket. Air for inflation, at 30 psi pressure, is supplied by a small portable compressor that is hauled around on a pushcart. As the building is air conditioned, windows are normally kept closed.

Taking the Terror Out of Fire

How Ashland Refining Company Protects Kenova Oil Pumping Station

Robert James

BEFORE AND AFTER

The main pumps of the station (top-right) are driven by Allis-Chalmers explosionproof motors. Overhead may be noted three of the foam-dispensing nozzles. Between the two in the foreground is a thermostat that will put the system into operation if the temperature rises sufficiently. The other picture shows the same room when the doors were opened following a test of the fire-fighting equipment. The pumps and motors had been covered with tarpaulins to simplify cleaning up afterwards. The clinging and flowing characteristics of the foam are apparent.

BACK in 1924, when the Ashland Oil & Refining Company (then known as Ashland Refining Company) was started, the possibility of losses by fire in the petroleum industry was always a matter of serious concern. Today, the use of modern methods of fire prevention and fighting has done much to lessen that danger; in fact, there are automatic systems in service that are capable of extinguishing a fire without any other help.

Recently, the Ashland Oil & Refining Company installed the most modern apparatus of this kind in its pumping station at Kenova, W. Va. It is of the foam fire-extinguishing type that is completely automatic in its operation and can flood the pump house and outside manifold with up to 26,880 gallons of smothering Pyrene foam within fifteen minutes from the start of a blaze. A thermostatic device located near the ceiling of the station initiates the snowstormlike flow by responding to a sudden rise in temperature and turning on a Motorpump, which forces water under high pressure into two tanks filled with the liquid foam stabilizer. The solution is piped to a series of nozzles, where aspirated air causes it to expand, spraying the foam formed down upon the pipes, motors and oil pumps and covering the floor to a depth of several feet.

The foam, which is fireproof of course, clings tenaciously to all surfaces, spreading out over and floating on top of any pools of oil resulting from leaks or breaks in the piping. It readily smothers the fire and protects the valuable machinery. Besides, the solution is noncorrosive—does not harm or rust the pumps and motors—and is easily cleaned up afterwards. The action of the system is shown in accompanying pictures that were taken during a test of the installation. Only half of the solution was used for the experiment, and the flow of foam lasted 7½ minutes.

The Kenova pumping station receives oil from the company's barges plying the Ohio River and relays it to its refinery at Catlettsburg, Ky. There the crude is refined and converted into regular and ethyl gasoline, kerosene, domestic and industrial fuel oil, asphalt, jet aviation fuel, etc. Some of these are marketed under the trade name of Ashland. Products from other refineries owned and operated by Ashland Oil and located at Louisville, Ky., Freedom, Pa., Buffalo, N. Y., and Canton and Findlay, Ohio, are sold under the names of Aetna, Frontier, and Valvoline (a motor oil). Others are distributed by independent dealers under their own trade names.

Much of the oil that passes through the station is brought by barge from Louisiana oil fields up the Mississippi to the confluence of the Ohio and thence to the terminal at Kenova. River transportation is handled to a large extent by the company itself, particularly since the latter part of 1951 when the *Allied-Ashland* and the *Aetna-Louisville*, believed to be the most powerful towboats on the inland waterways, were added to its fleet. Each of these giant tugs develops 4800 hp and can push barges containing 175,000 barrels or 7,350,000 gallons of crude oil upstream to Ashland's refineries. Just one of these boats with its integrated tows is more than 1/5 of a mile in length. In addition the company operates several other tugboats and also ships oil to the Ohio River refineries and terminals by contract carrier barges.

When a barge docks at Kenova, the oil flows through the main pumps to the refinery at a rate of as much as

4000 barrels an hour, and the new protective installation was especially designed to handle a fire that might occur during this peak pumping period. So sensitive to a rise in temperature is the detector that controls the start of the foam cycle that a rag soaked in hot water and applied to it was all that was needed to set off the test pictured.

The pump—an Ingersoll-Rand 3-CRVH centrifugal Motorpump—forces water at approximately 150 psi into the foam-stabilizer tanks, each of which holds 60 gallons. The spray nozzles which apply the resultant foam are suspended from the ceiling of the building and from an arm overhanging the outdoor manifold. Each is about 15 inches long and 2½ inches in diameter and includes the air aspirating unit and a baffle against which the mixture of air, water and foam compound is directed to insure proper distribution. Expansion of the water-foam compound solution is about 8 to 10 times the original liquid volume.

There are two general kinds of foam stabilizers in use: one is designed for service against petroleum-base liquid hydrocarbons such as gasoline and the other against water-soluble solvents like alcohols, esters and ethers. The latter type may be utilized for fighting both classes of fire or a combination of the two hazards that might occur in chemical process industries.

OUTSIDE EFFECT

A test snowstorm precipitated over the outdoor manifold where oil is routed to the refinery. Note the circular pattern of the foam spray as it leaves the nozzle and also how it adheres to the valve wheels below.

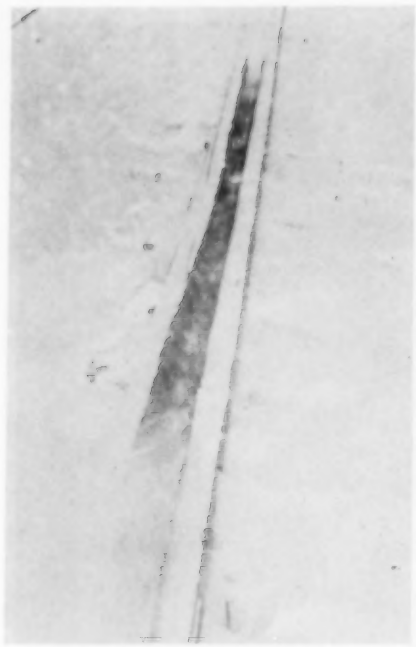
The development of the foam extinguisher came about shortly before World War II when scientists were searching for something to replace the "blankets" of carbon dioxide that were then commonly used to control blazes in lighter-than-water liquids. A number of improvements were made during the conflict, particularly by the Navy, which provided many oil tankers, mother ships for torpedo boats and submarines, and aircraft carriers with foam systems. The foam was referred to by that branch of the service as bean soup—and not without reason, because the hydrolized protein in the reagent was largely of vegetable origin—soybeans, for example. Since that time an increasing number of companies, typified by Ashland Oil, has installed equipment of this kind as the most efficient and positive means of fire protection available.

FOAM-GENERATING EQUIPMENT

The thermostat in the main pump room will, if a fire breaks out there, start up the Motorpump (foreground) which will force water into the 60-gallon tanks of Pyrene foam-forming compound. The resultant foam will be piped to the spray nozzles. Valving permits emptying one tank before the other one comes into play.

Waste Asbestos Salvaged

IT IS reported that present supplies of raw asbestos are critically short, and it is therefore of interest to learn that the National Bureau of Standards has developed simple methods by which fiber can be reclaimed from discarded asbestos and asbestos-cotton fabric. The work was undertaken at the request of the Navy Bureau of Ships because large quantities of asbestos cloth and molded asbestos, used to insulate pipes aboard naval vessels, are thrown away when they are repaired or refitted. By the processes, extraneous material such as cement and paint are removed from the material either by treating it with hydrochloric acid or a hydroxide solution. This is followed by thorough rinsing. Then the fabric is reduced to fiber in a paper-pulp beater. Recovery of asbestos from molded insulation is impracticable.



EFFECT OF BLOW

These pictures show a switch at the beginning of the blowing period (left) and after blowing had stopped.

Railroad Rescuer

Pneumatic Switch Cleaner

J. C. Pierce

COMPRESSED air, a vital factor in railroading, has again come to the aid of the industry with a device known as the Racor Snow Blower, which is designed to keep switches in efficient operating condition by keeping snow and dirt and other foreign matter out of the spaces between switch points and rails. Judging by what has already been accomplished, there is every indication that the new cleaning system will become a valuable addition to regulation track-maintenance equipment.

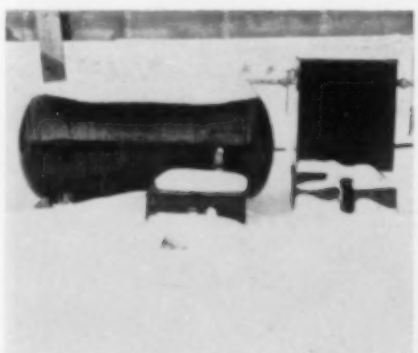
Railroad switches themselves need no description here, but some facts relating to their upkeep are little known outside of railroad circles and are worth consideration. To the layman, a switch is a relatively simple mechanical device that, by merely pressing a button or throwing a weighted lever arm, controls traffic between tracks. That, so far as he is concerned, is about all there is to it, except that a man with a swab occasionally dabs a little grease on a few joints of the assembly. Railway men wish that this picture were a realistic one.

In the busy yard and on main-line tracks the switch is as important as any other piece of railroad equipment—rolling or stationary—and at times is the object of grave concern. Examples of what may happen when one does not function properly need not be listed here, but it should be mentioned that managements install the best switches money can buy and take every precaution to keep them in peak operating condition.

At the turn of the century, pioneering roads were faced with the problem of obtaining adequate equipment for all purposes, including maintenance. Foundries and forges were not prepared to handle the business, and new designs or replacements were often furnished only after serious delays and at great cost. A group of farsighted men then decided to take corrective measures, and in 1902 consolidated five foundries. That marked the beginning of the American Brake Shoe Company, which has expanded greatly in the meantime and, through research, has played a foremost part in making the American railroads the efficient carriers that they are. It is this organization that has been instrumental in developing the Snow Blower.

Advances in metallurgy, founding and machining made it possible to provide switch components with reliable physical characteristics, and engineering skill produced the mechanisms for remote or direct control that assure virtually foolproof operation under ordinary conditions. With all that, it would seem that the railroad man's switch problems had been solved. Actually, that may be true in some regions, but not in others that are gripped months on end by Jack Frost.

Snow and ice are the maintenance man's chief adversaries in his struggle to keep switches clean and functioning. Their removal with shovel, pick and broom is tedious and hazardous and is still depended upon in places where such attention is required only occasionally. (We have been told that it has cost as much as $2800 annually to keep a single switch up to standard, and that may not be an unusual case.) But where switch-clogging weather prevails for prolonged periods, and where traffic justifies the expenditure, the work is now generally done by automatic means.



SETUP NEAR STATION

Cycling tank and other accessory equipment installed near a switch in a Calumet City, Ill., railroad yard. Air is piped to the tank from the yard supply system.

One popular cleaning method calls for the use of gas burners that direct the flame on to the switch, causing the snow to thaw. However, they are only partly satisfactory because they have been known to set ties afire and even oil tank cars and diesel engines stopped over a switch so equipped. When temperatures are below freezing, the melted snow may form ice and again render a switch inoperative. On main lines, the air drag of fast-moving trains often extinguishes the flame, and high winds do the same thing. And overheating of rails sometimes results in warped track.

There are also electric heaters that melt the snow as fast as it falls and prevent the formation of ice between switch points and rails as well as under the points except when temperatures are very low. This type of heater eliminates both the fire hazard and overheating of the rails, and it is unaffected by winds and the air set in motion by speeding trains. But in either case, unless the melted snow can be removed from the area, the roadbed becomes soaked, and alternate freezing and thawing cause heaving and distortion of the track. Obviously, something was needed that would be fully automatic and that could be depended upon completely to dispose of the freshly fallen snow either continually or intermittently in predetermined cycles from around the switch points. The answer was found to be compressed air.

It was logical to assume that if air could be used to sweep away snow, it would serve equally well in places where

wind-borne sand and dust accumulations clog switches. One major railroad company is applying the method with success in its yard at Superior, Minn., where iron ore, shaken out of cars as they are shunted around, seriously interfered with switching operations. The same thing is true of coal, gravel and other heavy materials jostled out of cars in yards or at switching points en route.

The idea of using compressed air to clean switches was advanced several years ago by a roadmaster on the Great Northern Railway, the system that is just south of the Canadian border and extends from Minnesota to the Pacific Coast. There is probably no other major railway in the United States that is so exposed to the ravages of snow and ice and that has to fight so hard to maintain traffic schedules over the white summits of the Cascade and Rocky Mountain ranges and across the wind-swept plains of Minnesota, North Dakota, Montana and Washington.

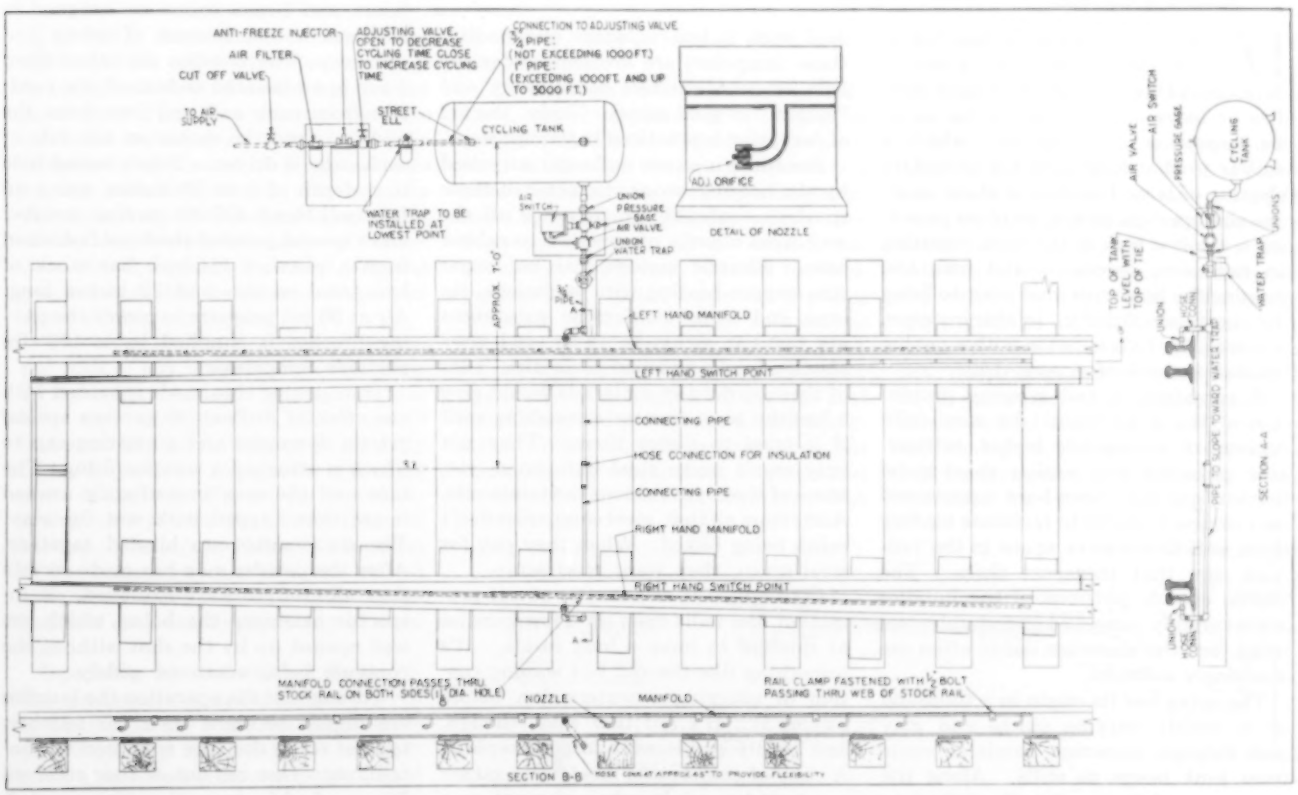
At first, the notion seemed impracticable because it was believed that the blast would have to be continuous and demand huge volumes of air; that is, prohibitive outlays for compressor installations. Then tests were made with a cycling valve to deliver air intermittently, and herein lay the answer to the problem. American Brake Shoe Company took over the research from there and has placed a sufficient number of units in operation to prove the practicability of the device and to tabulate cost data.

Air for the Snow Blower can be supplied either by an individual compressor serving one or more switches or, in the case of a railroad yard, by the main air system. It should be applied at about 100 psi, must be clean and dry and contain antifreeze, which is necessary to prevent ice from clogging the orifices of the blower nozzles where any remaining moisture in the air would condense. It also keeps the mixture of compressed air and atmospheric air from freezing and adhering to the track assembly and sleet from accumulating and solidifying in the switch.

The antifreeze injector introduces a small quantity of denatured alcohol into the air stream at a constant rate and is interposed between the filter and a cycling tank. The latter is located either above- or underground at the switch and varies in capacity with the size and the number of switches it serves. When the air pressure in the tank reaches a predetermined point, say 90 psi, an air switch opens a valve, causing air to flow to the blowing nozzles until the pressure is reduced to approximately 70 psi. At that point the switch closes the valve, the pressure in the tank is again brought up to 90 psi, and the cycle is repeated. It can be varied within certain limits, but normally the ratio of blowing time to build-up time is approximately 1 to 10. For example, if the blast is for a duration of four seconds, it would take about 36 to 40 seconds to recharge the tank.

The air released from the cycling tank passes through a pipe into manifolds which are attached to the rails in such a way as not to interfere with the switch points when they are thrown from one position to another. They are provided with adjustable nozzles spaced approximately 15 inches apart and usually set to direct their blasts toward the points of the switch. Each jet serves as a booster for the one ahead, the aggregate force at the recommended pressure being sufficient to move all loose material from the space between the points and stock rails and from beneath the points. The speed attained by the air during the blowing cycle is said to be around 60 miles an hour.

The original installation was made at Whitefish, Mont., in December, 1950, and three Snow Blowers were tested that winter. Six were added the winter of 1951-52, and some 25 more were put in service last season. Data accumulated during those periods show that the operating cost of the pneumatic method is approximately one-fifteenth that of hand labor and from one-third to one-fifth that of heating devices, or 13.7 cents per hour, with antifreeze accounting for about one cent of that sum.



TYPICAL ARRANGEMENT

Showing the various components of a blowing system. If no air lines run near the switch, a compressor has to be provided and enclosed for protection. The cycling tank may be buried between tracks or at one side of them.

Detecting 'Doctored' Steel Scrap

PIERCING A BUNDLE

A portable platform with an opening in the center is placed over the bale, which is then pierced as shown by an 80-pound paving breaker fitted with a special tool forged from hexagonal steel bar stock. A bundle with a hole so made is pictured in the inset.

SURPRISE!

After the bundle has been laid open by the exploding dynamite, some strange-looking "steel" scrap is revealed. Wood, for instance, as pictured here. Among other masquerading materials commonly found are dirt (sometimes filling almost the entire bale), grease, grindings and borings of miscellaneous metals, rags, BX cable and tar.

DYNAMITE blasting is resorted to at the Bethlehem, Pa., plant of Bethlehem Steel Company to open bundles or bales of purchased scrap metal for inspection. The method, which is similar to that long used for secondary blasting of large boulders in stone quarries and open-pit mines, involves punching a shallow hole in the bale, inserting an explosive, detonator and wire and capping the hole with mud prior to firing the charge electrically. In this instance, however, the hole is put in with a paving breaker instead of a rock drill.

A considerable and growing proportion of the scrap bought by steel mills consists of automobile bodies, refrigerator carcasses and similar sheet-metal fabrications that have been compressed into compact blocks to facilitate loading them and to conserve space in the railroad cars that transport them. The visible outside portions of the bundles are invariably composed of desirable steel scrap, but the materials inside often are startlingly different.

The scrap has its origin in a thousand or so widely varying places and may pass through numerous hands en route from junk heaps to mills. Along the line some of it occasionally falls into the hands of individuals who are without scruples when it comes to doing a little adulterating. Except that they deal with a less valuable commodity, these tamperers are brothers under the skin of counterfeiters of currency and "salters" of gold mines. Truly, the art of deception is practiced in strange ways.

Steel-mill men are no longer surprised by the heterogeneous character of these spurious contents, which range all the way from chunks of concrete to rubber hose. Electric motors that no longer run, copper-bearing wire or fittings, tin cans and other nonferrous substances are familiar sights to them, and they also see bricks and just plain dirt. Lots of these stowaway materials would give a healthy blast furnace a coughing spell if it tried to digest them. They not only won't make steel but, worse yet, some of them are ruinous contaminants. Aside from all that, steel companies don't relish being bilked. When they pay for steel scrap, they want steel scrap.

Consequently, as a matter of self-protection, the mills open up a few bundles at random to have a look inside. It's something like the old but waning custom of plugging a watermelon before buying it. It's not that easy, though, and hardly so pleasant to contemplate. A cube of compressed steel has a rather tough hide and it takes more than a can opener to penetrate it.

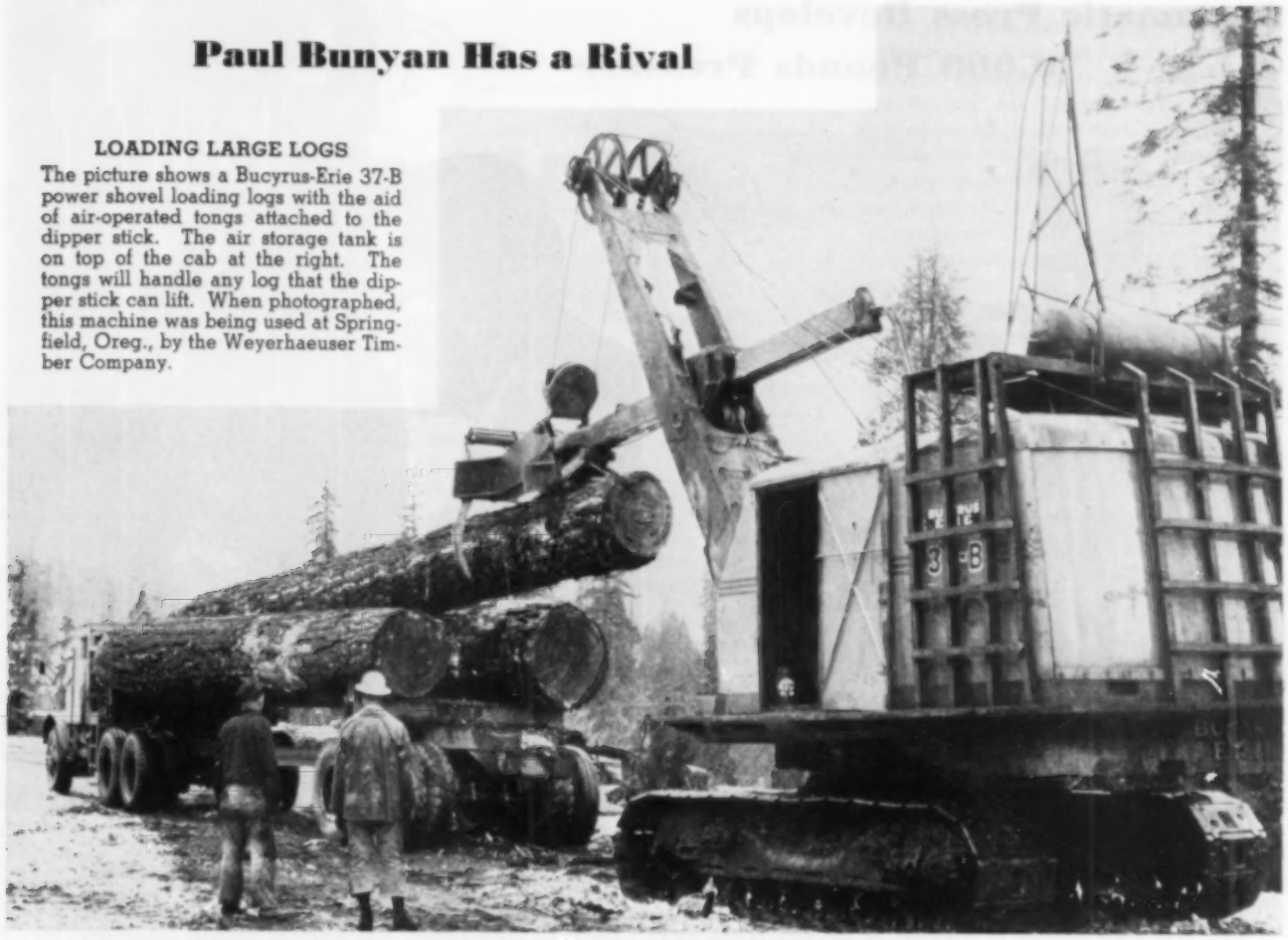
Before adopting the blasting procedure, Bethlehem tried drilling, friction sawing, band sawing, torch cutting and cold shearing but found all of them unsuitable because they were too slow or expensive, or they distorted or destroyed the bundle's contents. The method now practiced was then tried out and reached its present effectiveness only after considerable experimenting.

All purchased scrap arriving at the mill is now inspected during daylight hours, and 2-man teams are assigned to the task in the interest of safety and efficiency. Six bundles are taken from a car in an isolated section of the yard: two from each end and two from the middle. Into the center on one side of each cube is driven a 2-inch round hole to a depth of 8 or 10 inches, using an Ingersoll-Rand CC-80 paving breaker and a special, pointed steel tool fashioned from a piece of 1¼-inch bar stock of hexagonal section and 32 inches long. Air at 90 psi pressure to power the paving breaker is supplied by a 105-cfm portable compressor.

The opening thus made is loaded with one stick of duPont 30 percent special gelatin dynamite and a blasting cap to which is attached a wire for firing. The hole and the area immediately around it are then capped with wet fire clay. The six bundles are blasted together. After the powder man has made certain that all charges have exploded, an inspector examines the bales, which are well opened up by the shot without the contents being scattered widely.

Throughout the operation the bundles are tagged to show their car number, type of scrap they are supposed to contain, etc. One car out of four received from each shipper is normally sampled, but if inspection divulges poor-quality material, all cars from that particular source are checked.

Paul Bunyan Has a Rival



LOADING LARGE LOGS

The picture shows a Bucyrus-Erie 37-B power shovel loading logs with the aid of air-operated tongs attached to the dipper stick. The air storage tank is on top of the cab at the right. The tongs will handle any log that the dipper stick can lift. When photographed, this machine was being used at Springfield, Oreg., by the Weyerhaeuser Timber Company.

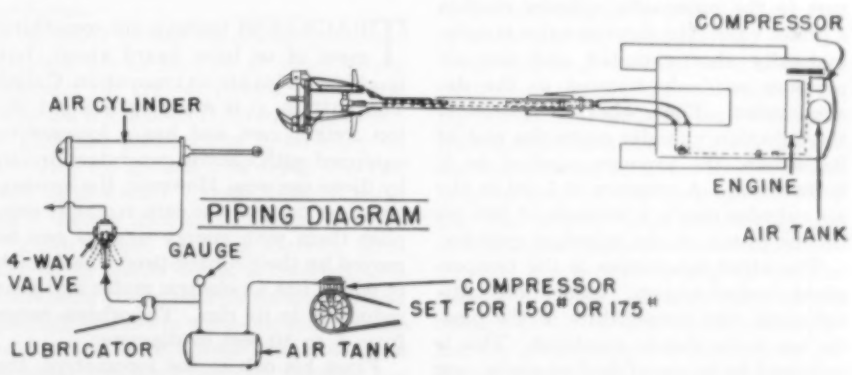
IN THE lumbering regions of the Northwest, the Berger-Rees air tongs is being hailed as the best log handler seen since Paul Bunyan and his blue ox Babe retired from the scene. The tongs can pick up and load huge sections of trees without difficulty. It works like the utensil used for serving lump sugar, olives, etc., but is much larger of course. And the squeeze that gives it gripping power is supplied by compressed air instead of finger muscles.

The tongs can be attached to the dipper stick of any power shovel, regardless of the latter's rating. It comes in four sizes with openings of 24, 30, 42 and 50 inches to fit shovels ranging in capacity from ¾ yard to 2½ yards. Opening and closing are effected by a double-acting air cylinder that links them at the top. The legs are bowed to conform to the contours of logs and can be had with three steel "rooster" spurs on the inside of each one to give the grip more bite.

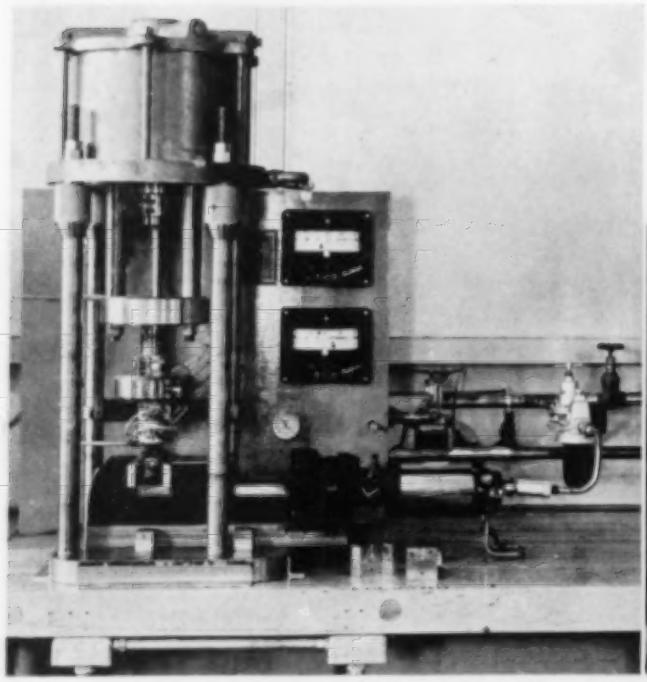
Operating air is furnished by a 30-cfm compressor installed in the shovel. It discharges at a maximum pressure of 150 psi into a 30x48-inch tank that holds a sufficient reserve supply of fluid power to meet the normal demand. The air is piped up the dipper stick, or inside of it if that member is hollow, and delivered by hose line to the cylinder. A control valve is located at the operator's station.

The appliance was conceived by L. N. Rees, superintendent of two logging camps of the Crown-Zellerbach Corporation, of Seattle, Wash. Design details were worked out by the Berger Engineering Company, of Seattle, which then began production. It is claimed that the device has greatly reduced the loading time per log and made the handling of small pieces of timber and broken "chunks" economical for the first time. In one case cited by the manufacturer, five trucks were hauling all the logs that could be loaded with conventional equipment. When the change to tongs was made, loading was speeded so much that six more trucks were put to work. The new method is also safer than the older ones because no one has to be in the proximity of the logs during the loading operation.

A log is grasped at a point on the near side of the center. As it is picked up, the far end swings down and the near one rises and "heels" against a saw-tooth plate that keeps it from shifting sideways. The butt of an unusually long log clears the plate and rests against the underside of the dipper stick. The tongs will handle any log the shovel can lift. Only one man is required to operate it as compared with two or more for other loading equipment. When there are no logs to be handled, the shovel can be reconverted to its original form and used for excavating.



Pneumatic Press Develops 70,000 Pounds Pressure



500 TO 1

When compressed air from the laboratory's distribution lines exerts its force on a differential piston in the 12-inch cylinder at the top of the press (left), a pressure 500 times greater is produced at the end of the small vertical ram. In the view at the right Dr. Francis R. Shonka, under whose direction the machine was designed and built, is examining an optical piece that had just been molded. Above his hand is an air-operated vise in which the molds are clamped. The Argonne National Laboratory is operated by The University of Chicago.

A PNEUMATIC injection press for plastics that develops pressures up to 70,000 psi has been built and placed in service by Argonne National Laboratory at Lemont, Ill., for the production of optical pieces for atomic radiation exposure meters. It represents a marked departure from conventional hydraulically operated machines and embodies two features that are unique in presses designed for shaping plastics.

The first improvement is the great flexibility with which the working pressure is controlled. The machine is actuated by an air cylinder and is provided with electric valves that regulate the speed of injection through an adjustable throttle valve. When the pressure in the pneumatic cylinder reaches a preset value, the throttle valve is automatically short-circuited and the air pressure suddenly boosted to the desired value. Thus, when the piston of the injection cylinder nears the end of its stroke, the pressure applied to it is increased. A pressure of 1 psi in the air cylinder exerts a pressure of 500 psi on the piston of the injection cylinder.

The other innovation is the temperature control system. In molding critical parts, the temperature of the plastic has to be closely regulated. This is achieved by means of dual controls: one for the upper and the other for the lower section of the injection cylinder. The latter section, which consists mainly of the plastic spreader and nozzle, is constructed of stainless steel with a minimum thickness of only 0.01 inch and reinforced with heavy copper collars to withstand the high pressure. Heat to melt the plastic is supplied by electrical bands and conducted through the copper collars and thin wall. Thus the material is brought to a liquid state in the top of the injection chamber, and as it moves downward it is further heated, entering the mold at the predetermined injection temperature.

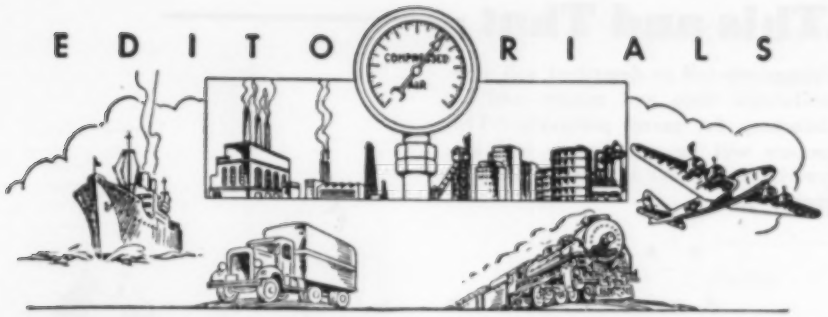
Because copper is a good conductor of heat there is less temperature lag than in presses of the customary type. This is extremely important in molding optical components and electrical insulators, because overheating causes carbonization and underheating serious stress conditions in the material.

The machine was developed by the laboratory's Research and Development Division under the direction of Dr. Francis R. Shonka. Compared with conventional plastic injection presses it is inexpensive, its components costing less than $1000. They can be assembled and tested in about 250 hours.

Trackless Train

TRACKLESS trolleys are something most of us have heard about, but trackless trains are an innovation. Called Tournatrain, it is made up of eight 20-ton freight cars and has a locomotive equipped with electric generators driven by diesel engines. However, the locomotive does not pull the cars, it simply supplies them with energy so they can be moved by their rubber-tired wheels each of which has an electric motor and gear reduction in its rim. The wheels range from 5 to 10 feet in diameter.

From his cab in the locomotive, the engineer applies power to all the wheels of the train, and through the medium of an automatic steering device each car is made to follow in the path of the locomotive. For example, when the latter pulls up to an intersection and makes a right-angle turn, each car, upon reaching the spot, will make the same turn, so it is claimed. This unusual means of transportation was developed by R. G. Le Tourneau, Inc., for bulldozed roads and desert or other areas where conventional means of haulage is difficult or nonexistant.



STRAWS IN THE WIND

AN AMERICAN industrialist's impressions of trade conditions in Europe are interesting in these times when not even a crystal ball can foretell with any certainty what sort of sailing our economy faces during the next few years. Christy A. Wiken, vice-president of research and engineering of Rockwell Manufacturing Company, Pittsburgh, Pa., expressed the opinion after a 3-month tour of ten countries abroad that West Germany has made the greatest comeback of all nations since the war both in rehabilitating former manufacturing facilities and setting up new ones.

Mr. Wiken believes that the West Germans now have the best-equipped plants in existence for producing machine tools, and the view is pertinent because the machine-tool industry is commonly considered to be somewhat of a barometer of forthcoming conditions in the capital-goods field. The only fly in the ointment is that these fine new West German factories aren't getting enough work to keep them humming, as those responsible for them apparently misjudged the demand for such tools.

When the plants were projected, the British, in particular, were anxious to place orders outside their own borders for "special" machine tools which their own establishments could not then turn out. Meanwhile, however, the British machine-tool builders have reached a position where they can handle the business and are so busy that one of the leading companies is quoting fourteen months delivery on turret lathes. Now, the firms say, they are receiving orders at a slower rate than during the past several years. In the long run the Germans, with their efficient new factories and extremely low wage scale, are believed to be in the best position to get the lion's share of new business.

There is food for thought in Mr. Wiken's observation that everywhere in Europe, and especially Germany and England, the system of training apprentices is being revived. He found many plants that were each training anywhere from 10 to 500 lads in the 14- to 17-year range. The usual procedure is to set up special schools for them, with competent instructors. Classroom lessons are interspersed from time to time with 3-month stretches of shopwork. The apprenticeship lasts 3½ years, in which time the boys receive nominal wages.

This movement will insure a future reservoir of skilled labor, something America very likely will not have. For that matter, such a training routine would perhaps appeal little to our youths who, in a few weeks, can learn to operate one machine and get almost as much pay as the all-around machinist who has acquired his knowledge after years of toil. Some American concerns are reported to be planning to take advantage of the European skilled-labor pool by establishing laboratories and other research facilities abroad. In doing this, they can get the type of help they require at a comparatively low cost and also obtain fresh viewpoints on some of their long-standing problems.

If such a move is made, Mr. Wiken thinks Holland will be a favored location because it has a considerable surplus of labor and little unrest among the working classes. Wages and the standard of living are highest in Switzerland and the Scandinavian countries, notably in Sweden, the American industrialist reports.

MODERN PLOWMAN

AN UNINFORMED contractor riding across the great southwestern plains or even in California in winter or early spring might believe that his eyes were playing tricks on him. Here and there, far from a town or any construction project known to him, he might gaze in amazement on a train of heavy earth-moving machinery marching across flat terrain. Actually, he would not be looking upon a mirage, as scenes such as this are becoming fairly common in the prairie regions west of the Mississippi River.

As many as four big crawler-mounted tractors are to be seen at times linked together for greater pulling power and drawing not construction equipment but a king-size plow. The latter may be cleaving the ground to a depth of 5 feet and casting aside a vast stream of earth as it moves inexorably along.

Deep tillage, which is literally turning farms upside down, is credited with increasing crop yields phenomenally and putting new life in worn-out soils. Years of farming have drawn heavily on the original nutrients; normal plowing has permitted the blazing sun's rays to penetrate the top fifteen inches and destroy bacterial growth; while irrigating water has leached out organic matter, plant food and even the finer particles of earth. Such impoverished soil has produced continually declining crops. Plant diseases met little natural resistance, and a streak of hardpan—termed the plowsole layer and developed at the floor of the plowing zone through the years—formed a barrier to probing roots.

Deep plowing goes far below the hardpan, breaking it up and burying it as the earth beneath is brought to the top. Unused fertilizer carried downward by water is brought back up, soil organisms start to work, and crop growth is stimulated. Another benefit is realized in the sandy areas in which the Southwest abounds, there being two million acres in four adjoining Oklahoma counties alone. In dry years, of which there have been several lately, sandy soil that has been plowed blows away, taking seeds with it before they have a chance to start growing. Deep plowing brings clay to the surface and anchors the top soil. If the clay content can be brought up to 8-10 percent the earth will hold well against the wind, and this proportion is possible in many sections. Some Texas fields that were deep-plowed seven years ago are still holding firm.

The new technique was inaugurated in Oklahoma in 1934 or 1935. Plows then available wouldn't go deeper than 14 inches, but since then they have been gradually improved as well as strengthened to resist breakage by stumps or other buried objects. Most of the land was in cotton, and yields that had been pathetically low were increased almost immediately. Because the seeds of surface weeds were buried, cotton-hoeing costs dropped from as high as $9-10 per acre to $2.50 the first year.

Although some plows reach 5 feet down, the average effective depth is probably around 36 inches. When working in the latter range and cutting a 7-foot strip, a plow will move 2 cubic yards of earth with every 3 feet of travel. As it covers around 1¼ acres per hour, it turns up an enormous quantity of material in a 20-hour day. And with more than a million acres deep-plowed in several states so far, the total amount of earth shifting is staggering.

All this is of interest to established contractors in the areas concerned. During winter and early spring, which are their normal slack seasons, many of them are now plowing farms on contract, thus keeping some of their equipment busy the year round. But before they got into this new business some strictly agricultural contractors sprang up to take care of it. Today, some of them are big enough to bid on construction jobs during the nonplowing months and are offering old-time firms keen competition.

This and That

It's an Ill Wind, Et cetera

Since January, 1950, the U. S. Bureau of Reclamation has been driving the 6½-mile Tecolote Tunnel to carry badly needed water for domestic and irrigation purposes to Santa Barbara and four nearby county districts in California. Although 4700 feet of the bore remains to be excavated, the project has, through a quirk of Nature, already provided a sizable supply to the areas concerned.

The water is flowing into the tunnel from the rocks penetrated, and the contracting firm handling the job has been unable to curb it. As a result, the firm has appealed to the Bureau for revision of its contract, and a consulting board of professional engineers has been appointed to study the situation and find a solution of the difficulty. Meanwhile the water, which issues from the ground at about 112°F and reaches a maximum volume of 3700 gpm, is alleviating the drought in the Santa Barbara section.

★ ★ ★

Building Without Mortar

A 30x80-foot structure of concrete blocks was recently built in Kansas City, Mo., without using mortar in the conventional way. Instead, successive courses of lightweight dry blocks were laid on a level foundation to window height and a coating of concrete was applied to the outer surfaces with compressed air. Next, anchoring metal mesh was fastened to the walls and concrete shot against it to a thickness of ¾ inch. Then window and door frames were set and the walls carried upward as before, with air-placed concrete filling the gaps between frames and walls. The structure was put up as an experiment by Air Placement Equipment Company, which makes Bondactor pneumatic guns for applying concrete. The concern's engineers believe that buildings erected as described will save considerable time and money and be satisfactory for many purposes. The structure will be put to use and observed over a period of years to see how it stands up.

"Feels good on the toes, don't it?"

★ ★ ★

Building Leans on Hillside

A rocky knob near the heart of the business district of Kansas City, Mo., was long considered unsuitable for building purposes. It remained undeveloped until Hallmark Cards saw a way to take advantage of the supposedly unfavorable topography and selected it as the site for a $6 million structure. As the building rises adjoining the slope, each of its eight floors will be larger than the one below and will have a direct entrance from the hillside. The eighth floor will be at a sufficiently high elevation to extend over the top of the mound and will contain 200,000 of the total 760,000 square feet of floor space. The roof will be a parking place for nearly 400 automobiles.

The structure will house offices, means for finishing the greeting cards the firm makes and artists' studios with such facilities as a zoo, greenhouse, art gallery and museum. A cafeteria with a seating capacity of 600 will be convertible into an auditorium. Materials received on the top floor will progress downward with the aid of gravity transportation.

An unusual feature will be a "personal-service unit" where employees may procure their automobile licenses, make bank deposits and pay their utility bills. A double-deck bridge will connect the new building with the concern's older plant across the street. A conveyor belt and a pneumatic-tube system will carry materials between the two.

★ ★ ★

From Oil To Copper

Because the going has been getting increasingly tougher in their own field, some Canadian gold-mining companies have been venturing into the oil industry in recent years. In this country, the Union Oil Company of California has reversed the procedure by opening a copper mine in Arizona. The move came about naturally. In 1950, Union bought United Geophysical, Inc., for use in seeking new sources of petroleum. One of the geophysical field crews detected indications of metal in Arizona, and eighteen bore holes subsequently put down confirmed the existence of a sizable body of good-grade copper ore. A shaft has been sunk 625 feet, and is going deeper. The operations are in charge of a separate subsidiary, Pima Mining Company. It and United Geophysical are headed by Herbert Hoover, Jr., son of the former United States president.

"I think we're getting close. I've finally found a place for our signature."

★ ★ ★

Leaves Ladies Lintless

In an advertisement of New Departure ball bearings it is stated that some of the bearings for precision instruments are so delicate that even a speck of lint or dust might throw them off balance. To guard against this, they are made in an air-conditioned room and the women employed there are required to wear nylon uniforms. In addition, before they go on duty, they are brushed off with a jet of compressed air to remove all lint.

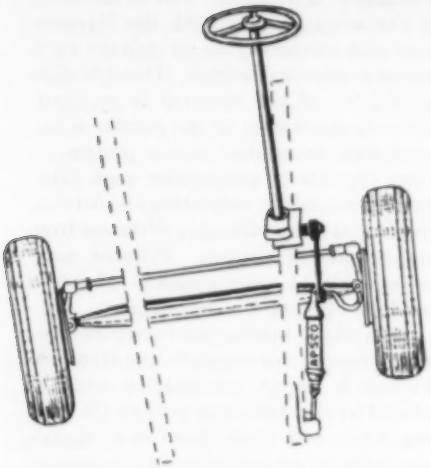
★ ★ ★

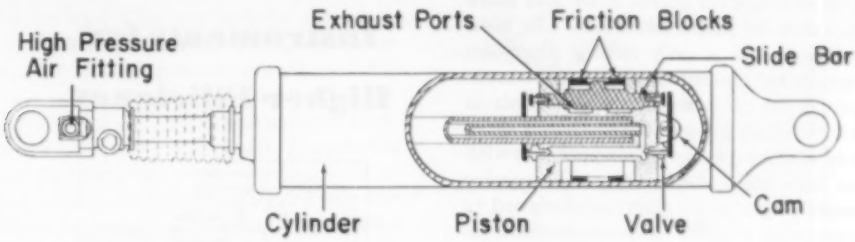
More About Magnets

Ever since we published an article on the varied industrial uses of magnets we seem to run into more of them at every turn. The services they perform in removing tramp iron from unwanted places has spread from their original application ahead of coal pulverizers in steam-generating plants to any number of materials and locations. The latest of these uses to reach our attention is one in a tuna packing plant.

In Youngstown, Ohio, Matt Bozichovich, an employee of Youngstown Sheet & Tube Company, got $500 recently for thinking up a magnet that is shaped to recover ferrous metals from refuse piles. It is built on the lines of an ice-cream cone. When dropped into a trash pile it penetrates well and comes out bedecked with pieces of metal.

Steering Booster Promotes Safe Driving





HOW THE BOOSTER LOOKS INSIDE

The device uses air directly from the pneumatic brake system of heavy automotive vehicles and enables drivers to steer them even on the softest ground. It is attached (left) to the frame at the shaft end and to a moving member of the steering linkage on the other—in this case to the pitman arm. One air line serves the attachment.

A NEW development which should prove of considerable help to operators of heavy trucks, buses, military vehicles and off-the-road construction and maintenance machinery is called the Air-O-Matic Power Steer Booster. Exactly what its name implies, the unit is easily attached to new or old vehicles of all types and is operated by air from the pneumatic brake system.

The booster embodies an ingenious valving arrangement that admits air to one or the other end of a double-acting cylinder when caused to function by the truck driver through the steering gear. The twin valve is partly on and within the piston and is made up of the following components shown in an accompanying illustration: of a set of friction plates bearing directly on the cylinder walls and attached to a sliding bar that impinges at each end against a lever linkage and of a spring-loaded and normally closed needle valve that is opened by the sliding bar through the action of the lever. The friction plates are within a recessed part of the piston, the bar slideway is inside the piston, and at each end of the latter is a lever-and-valve combination. Air is admitted to the valves from a receiver that is located in the piston and charged by way of the innermost tube of a double-tube hollow shaft.

The booster is mounted with the shaft end fastened to a stationary member of the vehicle, usually the frame, and the cylinder is attached to a moving member of the steering linkage such as the pitman arm or drag link. One air line suffices to bring compressed air to the shaft clevis or fastening. In operation, an initial impetus is given to the steering linkage and, incidentally, to the cylinder by the driver as he starts to turn the steering wheel. The friction plates, of course, tend to move with the cylinder, causing the slide bar to impinge against the lever at the end of the piston facing the receding head of the cylinder. The lever opens the valve and admits compressed air into this cavity. The air, in expanding, forces the cylinder away from the piston and gives the steering linkage a powerful supplemental boost.

As soon as the driver of the vehicle stops turning the steering wheel, the cylinder advances (or retracts) just far enough to center the friction plates in the recessed area, the position in which the valve is closed and the compressed air is exhausted from the cylinder through ports in the piston leading to the outer tube in the hollow shaft. The slide bar covers the exhaust ports at the pressurized end of the cylinder as it moves to open the valve, thus preventing the air from bleeding out until the turning movement is completed. The exhaust ports at the other end remain open and permit the air to escape as it is displaced by the piston.

Manufactured by the Air-O-Matic Power Steer Corporation, the booster unit is said to take most of the work out of steering heavy vehicles, even on soft or sandy ground, and to be completely automatic, safe, jam- and foolproof. The cylinder proper requires no lubrication, but the frame and steering-linkage connections are provided with grease fittings and lubricated when the vehicle is regularly serviced.

ON, UP, AND OFF

Built to operate with feed-in and discharge belts, this vertical conveyor carries cartons from one floor to another much faster, it is claimed, than can the conventional type of elevator. Cases are delivered by a horizontal traveling belt, which feeds them automatically on to the vertical section. There they are gripped tight between friction-surface belts supplemented by spring-loaded rollers through which the conveyor can adjust itself to take cartons varying up to 2 inches in size. (Can be designed for 4-inch adjustment.) At the upper level an offset roller shoves the cases, in turn, onto the discharge belt. The new vertical in-line system was developed by Conveyor Specialties Company, which installed the first one in a brewery. According to reports, it is delivering cartons from an assembly station in the basement to a horizontal conveyor 30 feet above and has increased the volume handled by 1600 cases an hour.

Proposes New Valve for Train Air Brake

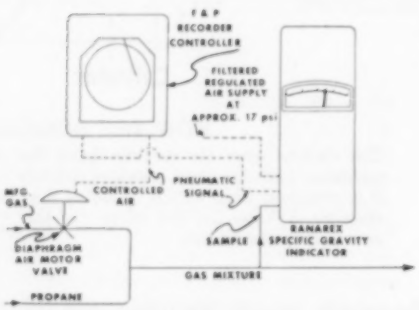
A FREIGHT train conductor living in Galesburg, Ill., has given the Interstate Commerce Commission an idea he thinks would improve the braking of trains and perhaps reduce accidents. He is David P. Lindberg, a veteran employee of the Burlington Railroad, and he calls his conception an "air-bleed" valve. If attached to the rear car of a train it would, he claims, gradually let the compressed air out of the line and thus set the brakes from the rear forward and thus prevent cars from piling up on those in front in case of a derailment or collision. The idea came to Lindberg after a passenger train out of control plowed into the Washington, D. C., Union Station a few months ago. In a similar manner, he contends, the brakes on a train brought to a halt on a grade would be automatically set if the locomotive were to be detached without the brakes first having been properly adjusted.

Companies Combine Instruments for Higher Efficiency

INDUSTRY'S increasing dependence on automation places more and more emphasis on instrumentation. In view of this fact it is only natural that two companies manufacturing complementary types of instruments and controls in which they are specialists should agree to combine certain of their products with the idea that they will serve requirements better when they are designed to operate as a unit. The equipment involved are Permutit's Ranarex gas specific gravity detector and a Fischer & Porter pneumatic transmitter, recorder and control instrument.

The specific-gravity detector works on the basis of differential degrees of torque caused by whirling gases that impinge against impulse wheels. It consists of two chambers in each of which is a fan or impeller driven through a shaft at constant speed and of an impulse wheel affixed to a separate shaft that extends out from the chamber and is connected by suitable linkage to the other impulse-wheel shaft.

A sample of gas to be analyzed is drawn into the lower chamber and caused to rotate by the impeller, which imparts torque to its companion impulse wheel. This torque is proportional to the gas density and is compared with the torque produced similarly but with atmospheric air in the upper chamber, in which the impeller rotates in the opposite direction. The difference between these opposing torques is the specific gravity of the gas and is registered on a calibrated scale by a pointer connected to the impulse-wheel shafts. The measuring instrument responds to changes within 5 to 20 seconds because no chemical reaction is involved, and as the temperature and humidity of the gas sample and air are uniform, the possibility of errors from those sources is eliminated.



PROPORTIONING SYSTEM

Diagram shows how the specific gravity detector and the pneumatic recorder controller are combined to mix manufactured gas and propane.

The other half of the apparatus is the Fischer & Porter deflection-balance pneumatic transmitter that is mounted in the same housing with the Ranarex unit and connected to its pointer by a single mechanical linkage. Thus the high sensitivity of the detector is retained, and any movement of the pointer is immediately translated into a pneumatic force capable of performing such functions as recording, indicating and/or controlling at a considerable distance from the measuring station. Filtered compressed air at approximately 17 psi is used to operate the instrument.

In a plant mixing manufactured gas with propane, for example, the Ranarex-Fischer & Porter combination could be placed at the discharge port of the mixing valve and from there send signals not only to an indicator in the control room some yards away but also to a pneumatic-diaphragm motor control valve interposed in either of the lines leading to the mixing valve. An installation of this kind is shown in the accompanying schematic diagram. In this manner the entire process can be made fully automatic as well as self-recording. Whenever the specific gravity of the mixed gas exceeds or drops below a certain point the valve will either open or close, the difference will be registered on a graph, and the length of time required to bring the gas back to normal will, incidentally, also be indicated.

Glass-lined Smokestack

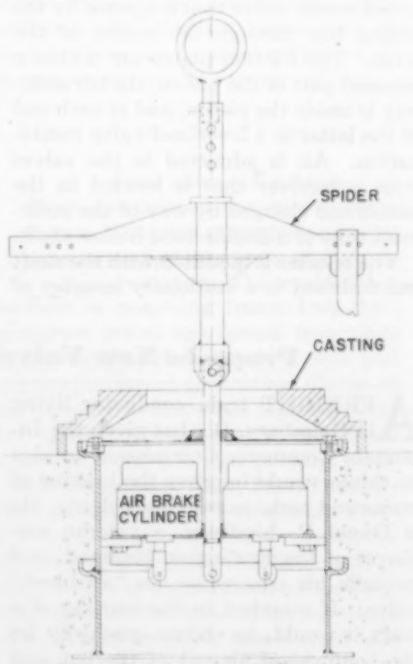
IF EXPERIMENTS now being conducted by the A. O. Smith Corporation are up to expectations, steel smokestacks of the future may be covered inside and outside with a film of special acid-resisting glass. Today, industrial stacks are generally built of steel instead of masonry, and it is estimated that about 5000 have to be replaced annually in the United States because of the corrosive action of the acid condensate in the smoke.

At its Milwaukee, Wis., steel fabricating plant, the corporation has erected a powerhouse stack 85 feet tall that is coated inside and out with two layers of glass each approximately 0.005 inch thick. Bonding was effected at 1600°F by a new method developed by the company, which has had considerable experience with fusing glass to steel. To determine the effectiveness of the lining, glass-encased test panels were suspended in active smokestacks for periods up to a year and showed no signs of deterioration at the end of that time. However, the new and novel stack is considered to be a guinea pig and as such is to be kept under close observation for a number of years.

Air Equipment Mounts Rims and Tires Quickly

ASSEMBLING rims and tires for heavy-duty Autocars manufactured by The Autocar Company, Ardmore, Pa., was an arduous job until plant engineers designed pneumatic equipment that enables one man instead of two or three to do the job quickly and safely and without risk of damaging the tire and rim. The device, plans for which are offered free to the industry, consists of a stepped-down circular casting which can hold wheels or demountable rims 20, 22 or 24 inches in diameter. It is set over a pit, 18 inches deep and 24 inches in diameter, with the bottom at floor level. Mounted on a plate in the pit are two 6-inch diameter Westinghouse air-brake cylinders with a 2¾-inch stroke and a capacity of 1500 to 2000 psi. Their cylinder arms are fastened to an 11-inch steel crosspiece from which a 2-inch spindle rod rises and extends up through the casting to a point about 5 inches above the floor.

The work proceeds as follows: The operator places a rim base on the casting, drops the tire on it, slips on the side ring and positions the locking ring. Then he lowers a 3-armed spider, hooks it on to the spindle rod and locks the two with a quarter turn. The three arms notch on to the side ring and, when compressed air is turned on, force it, together with the tire bead, past the locking ring seat on the rim. A sharp tap with a hammer seats the locking ring, and that's all there's to it, says the company, except to release the air and move the tire to Autocar's new safety stall where it is inflated with air at from 72 to 100 psi pressure.



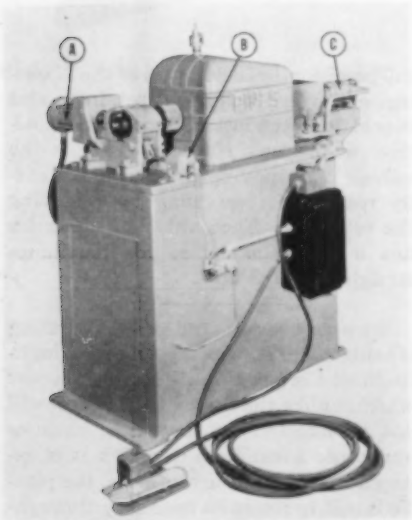
Industrial Notes

From one pound of extra-fine Fiberglas yarn, a New England textile mill is weaving 20 yards of cloth 36 inches wide. The fabric is said to be so sheer that it floats on a puff of smoke. It is being used in making electrical insulating materials and as a reinforcing in plastics.

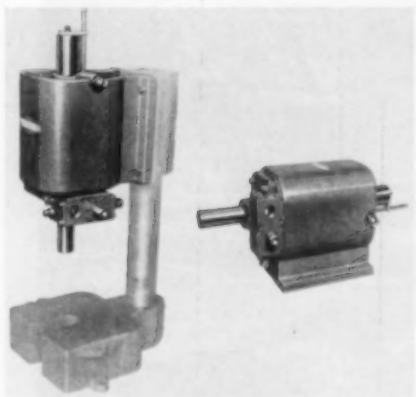
New fire-retardant coatings for wood and metal that form a cellular insulating "mat" when exposed to flame are being marketed by Albi Manufacturing Company. The latter claims that the mat resists both heat and flame and that it can be scraped off easily, leaving an undamaged surface ready for refinishing. The coatings are available in several colors and can be applied by brush or air spray.

Internal Growler is the name of a small electric instrument that has been designed by Crown Industrial Products Company to detect short circuits in rotors or stators. It operates on 115-volt a-c current and energizes the coil area as it is passed over their surfaces. When directly over the trouble spot a meter gives a positive reading through the movement of a needle.

Plants that do a lot of work requiring deburring, chamfering and facing operations are finding a new end-finishing machine very useful, it is claimed. The unit is air powered, has a 2-inch stroke and a maximum spindle speed of 2000 rpm. When the workpiece has been inserted, pressure on an electric foot switch starts the clamping and feeding cycle by admitting air to the three pneumatic cylinders shown in the accompanying illustration. "A" closes the chuck, "B" swings a pivoted work-locating stop out of the way, and "C," a Bellows cylinder and Hydrocheck, advances the spindle and controls the feed rate of the tools. "A" and "C" are supplied with air at 70-80 psi by the same line. When the cut is completed, the spindle automatically retracts and the workpiece is released. The end finisher is built by Pines Engineering Company, Inc., and is designed for such operations as light turning with hollow mill tools, chamfering and pointing bar stock, shaping tube or rod ends and center drilling. Tools and chuck-jaw inserts are interchangeable for stock up to 3 inches outside diameter.



Air-Hydraulics, Inc., has announced that the head of its Model Z-2 "Exploded Air" Impact Hammer is now available as a separate unit for installation upside down or at any angle that best meets the needs of certain operations. By way of example, the company cites the case of a manufacturer who has mounted it upside down and is now "heading six rivets with it instead of one per stroke, gravity holding all six in place while the hit is made." The hammer has a rated capacity of 12,000 pounds, is operated with air at 100 psi line pressure, and rated at 60



strokes per minute when hand or foot controlled and at 120 per minute when equipped with a solenoid valve and guide-rod switches for automatic operation. It is suitable for light stamping, forging, trimming, molding, crimping, coining and riveting.

For field use on sizable construction jobs, Dravo Corporation has designed a magazine for storing explosives that is said to offer a maximum of safety. It's a small portable house set up on a concrete or timber base and provided with a false overhanging roof that shades it from the direct rays of the sun. Built of steel, it has wooden studding on the inside walls, and danger from lightning and static is lessened by grounding the containers holding the explosives.

For jobs that involve handling granular materials of all kinds and that do not warrant the installation of costly pneumatic conveying systems, Injection Molders Supply Company is manufacturing hoists that can be readily adapted

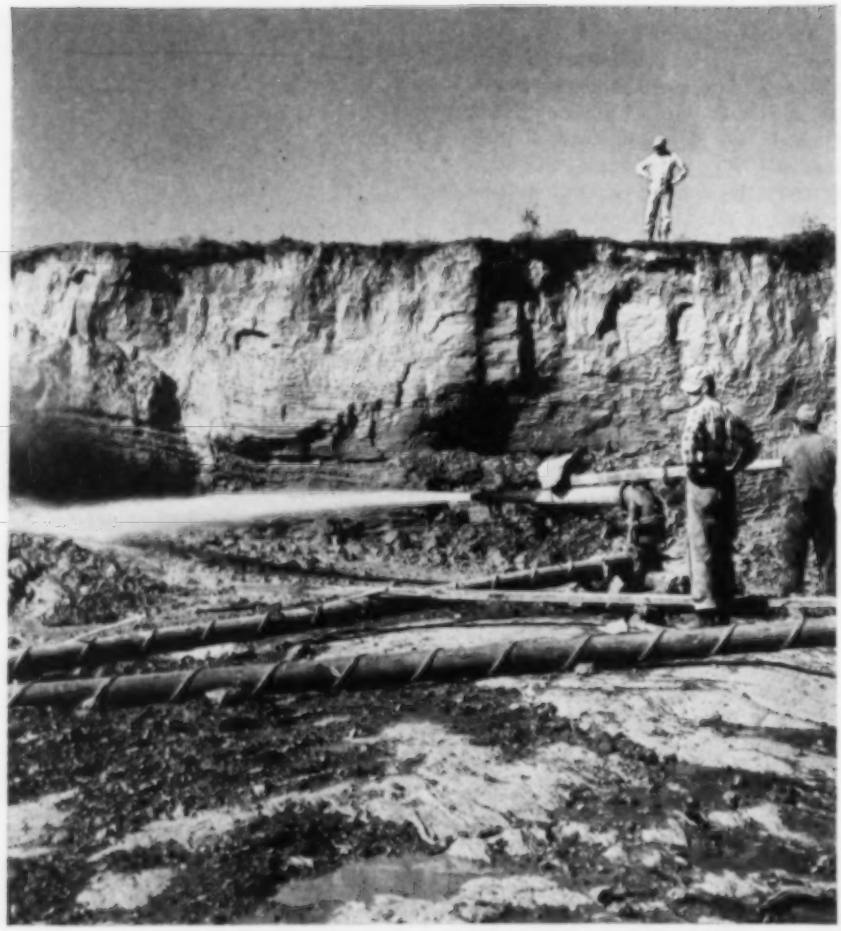
to meet specific needs. The equipment pictured is a stock model, complete with bin, cyclone, motors and feeder pipe. A unit with a bin holding 800 pounds is being used to fill the elevated hopper of an injection molding press with powdered styrene at the rate of 20 to 25 pounds a minute, the operator of the press controlling the flow with a starting switch. Total carrying distance ranges from 50 to 60 feet. If desired, a feed weigher may be incorporated in the system.

It has been announced by Mitchell-Bradford Chemical Company that its newly developed blackening salt will give cast or malleable iron and stainless steel a lustrous ebon finish that will not chip, flake or peel. Called Black Magic S.S., the compound is mixed in the proportion of 5-5½ pounds per gallon of solution, in which the metal is immersed from 5 to 15 minutes at a temperature of 255-260°F. Cost of the application is said to be about a quarter of a cent per square foot.

Demand for large-size crucibles especially by the die-casting industry has resulted in a process that is said to permit the Electro Refractories & Abrasives Corporation to manufacture carbon-bonded silicon-carbide pots of exceptional capacity. The biggest previously made by the company held 400 pounds of aluminum; today it is producing crucibles that take 1100 pounds. In the case of heavier metals such as brass and copper alloys the capacity is proportionately greater, of course.

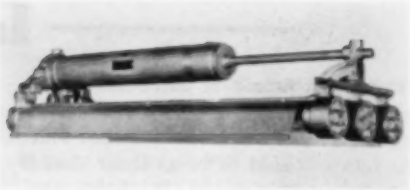
A fluorescent lighting fixture that can be used with safety in the presence of explosive gases or vapors or combustible dusts has recently been introduced by Crouse-Hinds Company. It is housed in a heat-resistant glass tube the ends of which are reverse tapered and sealed into a cast-aluminum housing that also

MAKING A GIANT EAT THE DIRT



When the pressure is on in hydraulic operations, you need lines that are extra strong, safe, leaktight. That's the reason mining engineers depend on Naylor, the distinctive lockseamed, spiralwelded light-wall pipe. It's easy to handle and install, especially with Naylor Wedge-Lock Couplings to speed connections. Its structure makes it ideal for heavy-duty service like this. Sizes from 4" to 30" in diameter. Write for Bulletins No. 507 and No. 513.

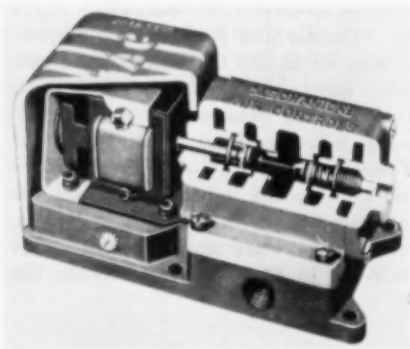
NAYLOR PIPE COMPANY
1245 East 92nd Street, Chicago 19, Illinois
New York Office: 350 Madison Avenue, New York 17, New York



contains the lamp receptacle. Fixtures can be placed end to end on close centers by a link member that permits the relamping end to be lowered several inches without interfering with the adjacent fixture. Tools are not required to release the lamp receptacle and mounting-plate assembly, which is locked into the housing by a bayonet joint.

For industrial exhaust or blower systems, Flexible Tubing Company is offering relatively smooth-bore tubing that is constructed to insure minimum reduction in cross-sectional area at bends. It is made of spirally wound rust-resistant wire and is covered with a woven fabric coated with a tough resinous compound. Known as Flex-flyte Green Label tubing, it is said to resist oils, acids, alkalies, gases and flame and to possess good aging qualities. It is available in lengths up to 50 feet and in diameters from 1 inch to 2½ inches in ½-inch increments.

The basic feature of an improved type of solenoid-operated air valve announced by Mechanical Air Controls, Inc., is a surface-hardened spool of aluminum alloy onto which the sealing material is molded and bonded. The spool enters

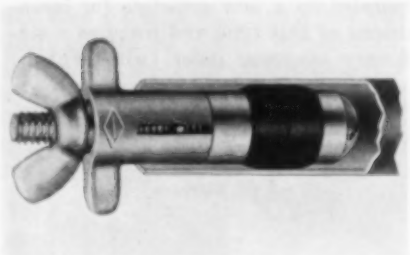


the precision-finished bores of the "bear-ingized" valve body and retainers and is said to effect instantaneous and positive air-pressure closure. This is the valve's only moving part, which is easily reached for servicing by removing the retainers. Each valve in the series has a full pipe orifice for maximum straight-through flow.

Wire rope for oil- and gas-well drilling is being manufactured by Jones & Laughlin Steel Corporation with a plastic core which, unlike the conventional type, will not be affected by the acids, caustics and other substances to which it is exposed in service. Furthermore, the plastic is said to retain its resiliency through-

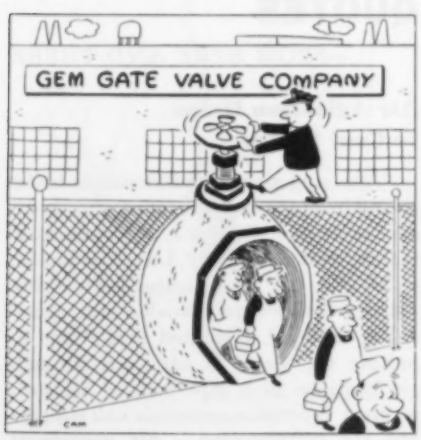
out continued application, and neither insufficient moisture during storage nor excessive moisture during use will cause damage. The rope is available in varying diameters from ⅜ inch up and with cores surrounded by from three to eight steel strands.

It is sometimes desirable or necessary temporarily to close the end of a tube carrying a liquid or gas, and for that purpose The Imperial Brass Manufacturing Company has provided a handy plug with a wing nut at one end and a synthetic-rubber section at the other. When the nut is tightened, the elastic element expands and seals the tube. The plugs are available in five sizes from



¼ to ¾ inch, outside diameter, and make it possible to test tubing installations before they are put in service or when trouble shooting for leaks. They are said to remain in place against a maximum pressure of 100 psi and can be used with all fluids except those that damage synthetic rubber.

Something unique in storage shelters for heavy machinery, dies, patterns, etc., which, more often than otherwise, are put outdoors for lack of space under cover, is being offered by The Joe Martin Company, Inc., manufacturer of industrial furnaces, which developed the metal housing for its own use. The structure, named Yard-Stor, looks much like a Quonset hut, but with these important differences: It is built in sections that may be tilted from either side to permit access other than through end doors, slid apart, telescoped or nested. For permanent storage, they are track-mounted, but for temporary use may



This is GARLOCK'S 3-Dimensional Picture

1. The Garlock representatives—112 of them—selling Garlock products and nothing else—making periodic calls on your plant—offering you the most complete line of mechanical packings manufactured by any company. These men are trained, experienced and, through interchange of information throughout the Garlock organization, conversant with your mechanical packing problems.

2. Twenty-three offices and three branch factories—with stocks of Garlock products—situated in most principal cities throughout the United States—convenient to you for prompt shipments and competent service.

3. Factories, laboratories, service engineers, resident engineers and pilot plant at Palmyra, New York—with background of sixty-six years' experience in the manufacture, application and development of superior quality mechanical packings—GARLOCK—The Standard Packing of the World.

This is the Garlock picture—unique in the mechanical packing industry. Take full advantage of it. It is yours for the asking.

THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK

Sales Offices and Warehouses: Baltimore • Birmingham • Boston Buffalo • Chicago • Cincinnati • Cleveland • Denver • Detroit • Houston • Los Angeles • New Orleans • New York City • Palmyra (N. Y.) Philadelphia • Pittsburgh • Portland (Ore.) • Salt Lake City • San Francisco • St. Louis • Seattle • Spokane • Tulsa.

Branch Factories: Birmingham • Denver • San Francisco.

In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.

GARLOCK

PACKINGS, GASKETS, OIL SEALS,
MECHANICAL SEALS,
RUBBER EXPANSION JOINTS

THE NEWEST, QUICKEST WAY TO MAKE ENDS MEET

the job's a snap...with a snap-joint

Here's the newest development in Mechanical Pipe Couplings—the Victaulic Snap-Joint *boltless toggle* pipe coupling.

The Snap-Joint extends the Victaulic Method into usages where speed and frequent dis-assembly and re-assembly are controlling factors. Snap-Joints assemble over the pipe ends in a matter of seconds with a speedy hand-lock . . . no wrenches required.

Snap-Joints, made to supplement Victaulic's famous line of bolted couplings, are ideal for temporary lines, valve, meter and pump connections and similar uses . . . their strength and durability make them completely reliable for permanent installations.

Snap-Joints fit Victaulic grooved pipe and the complete line of Victaulic Pipe Fittings . . . Ells, Tees, Reducers, Caps, etc. Every joint serves as a pipe union.

New Victaulic Snap-Joints are ready for your next job through all Victaulic Stocking Supply Houses. Available in pipe sizes: 1", 1¼", 2", 3" and 4". They are part of the world famous *complete* Victaulic Method of Piping.

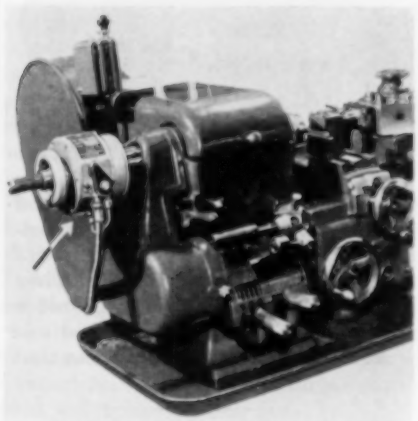
Write today for Victaulic Snap-Joint Catalog No. 44-8B

VICTAULIC COMPANY OF AMERICA • P. O. BOX 509 • ELIZABETH, N. J.

Office and Plant: 1100 Morris Ave., Union, N. J. • Telephone Elizabeth 4-2141
West Coast: Victaulic Inc., 2330 East 8th St., Los Angeles 21
Canada: Victaulic Co. of Canada Ltd., 406 Hopewell Ave., Toronto 10
Export: Pipe Couplings, Inc., 30 Rockefeller Plaza, N. Y. 20, N. Y.

be set on the ground or on timbers. At the Martin plant, finished furnaces weighing up to 50 tons are put out in the yard and the sections are simply lowered over them as needed. There are many applications for this new type of shelter in the agricultural, industrial and construction fields not only for the storage of materials and equipment but also to protect men at work.

An air control for engine and turret lathes handling bar stock up to 1 inch in diameter has been designed to serve as a substitute for hand levers and wheels for closing and opening collets—clamps that hold the work during machining. Named Wilson Air Collet Closer, it operates on a new principle for mechanisms of this type and features a stationary neoprene inner tube which,



when inflated with compressed air, closes the collet and, when pressure is released, opens it. Rings, pistons and packing are eliminated, and the use of a finger-tip- or foot-actuated valve that lessens fatigue increases production. The device is also said to prevent air leakage and slippage; to insure consistent accuracy through controlled holding pressure; and to adjust itself automatically with variations in size of stock or machined parts. The Collet Closer is being distributed by Durable Products.

QUOTES

—FROM HERE AND THERE

Air Agitation Helps to Cool Water

"Applying air to circulate water being cooled in a tank has several advantages," according to J. C. Monk, chief engineer, Golden State Company, Ltd., Los Banos, Calif. "In our plant, water for washing cottage cheese curd is cooled and stored in an 1800-gal. insulated tank. Air to agitate the water is admitted through perforations in a pipe located beneath a direct expansion ammonia coil supplying the refrigeration. Air movement

maintains flow of water around coils.

"Heat transfer from air to water is less than that encountered when mechanical agitation is used. However, circulation of water by air bubbling up past ammonia coil is adequate to bring tank contents down to 33 deg. F. with sufficient speed to supply our needs. This is accomplished without insulating coils by freezing water on them."

Food Engineering, July, 1953

Plastic Balls Save Crude Oil

"Tiny plastic balls floating on top of crude oil stored in huge refinery tanks have cut evaporation losses appreciably. The nitrogen-filled 'microballoons' are dust-size and form a blanket of foam that rises and falls with tank levels, virtually cutting off contact with the air. Millions of the tiny plastic balls are mixed with crude oil as it is piped into the tank, or are spread on the oil in the tank."

Petroleum Newsnotes July-August, 1953

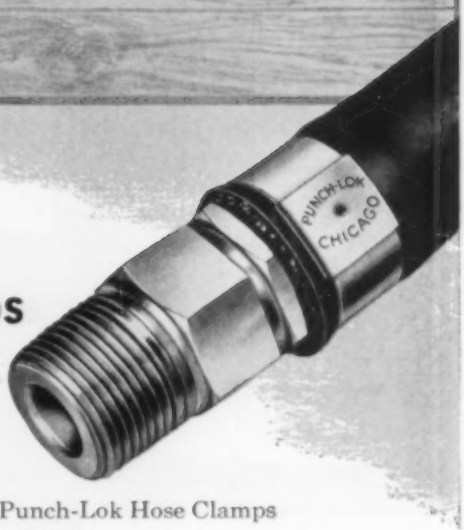
Alumina from Low-grade Ores

"A continuous process for producing high purity alumina from low grade domestic ores is ready to be licensed by Lobeth Corp., Chicago, after more than a year's operation in a European pilot plant. The continuous process recovers 99 to 100 percent of all reagents used. Operations purposely used low grade kaolin clay (10 percent alumina and 80 silica) to prove the ability of the process to handle impurities. Preliminary cost estimates are said to indicate that 99.9 percent alumina can be produced at 15 to 20 percent less than from bauxite with the Bayer process. Electrical requirements are less than 2 kwh per pound."

Steel, June 1, 1953

"Alfred, what a terrible thing to call a branch!"

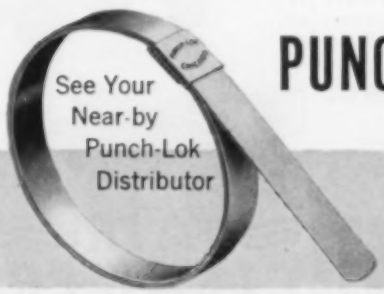
The Sign of a GOOD Hose Clamp



Punch-Lok Hose Clamps

Designed for applications where strength, durability, and economy are wanted, double-wrapped Punch-Lok Hose Clamps withstand vibration, have no projections to snag, and are easily locked in place to make a leakproof connection that outlasts the life of the hose.

Everlasting—Everywhere—Punch-Lok for Safety



PUNCH-LOK *Company*

321 North Justine Street
Chicago 7, Illinois

Industrial Literature

More than 800 pieces of apparatus and equipment for testing soils, concrete and bituminous materials on an engineering basis are described and illustrated in a 72-page catalogue—No. 53—issued by Soiltest, Inc., 4520 W. North Avenue, Chicago 39, Ill.

Preliminary Machining Recommendations for Titanium is the title of a booklet released by Mallory-Sharon Titanium Corporation, Niles, Ohio. It is based on detailed studies of machining operations, and users of the metal should find the information very helpful.

A 506-page catalogue on the complete Lunkenheimer line of valves and other products is now available and copies can be reserved for distribution by the firm's sales representatives and distributors. Requests should be sent to The Lunkenheimer Company, P. O. Box 360, Annex Station, Cincinnati 14, Ohio. Useful features of the book is a 24-page valve-selector guide and more than 100 pages of reference data.

Ingersoll-Rand Company has recently published a bulletin on its Class CNTA multistage centrifugal pumps designed specifically for boiler-feed, refinery, processing and mine services and available for 300-1000 psi pressures and in capacities up to 700 gpm. Of eighteen pages, it includes sectional drawings and installation views, as well as a 2-page chart showing the unusual interchangeability of parts throughout the line. Ask for Form 7251 when writing to the company's main office, 11 Broadway, New York 4, N. Y., or one of its branches.

Catalogue No. 200, obtainable without cost from Titeflex, Inc., 500 Frelinghuysen Avenue, Newark 5, N. J., deals comprehensively with its metal hose and fittings. Of 48 pages, it also contains charts giving frictional losses versus flow rates and information of aid in ordering hose.

Welded floats of stainless steel, monel and chrome, cadmium- or copper-plated steel for many services are described in Bulletin No. 753 being distributed by W. H. Nicholson & Company, 12 Oregon Street, Wilkes-Barre, Pa. Information includes buoyancy data and available shapes and sizes.

The uses and advantages of B. F. Goodrich Cutless Rubber Bearings for industrial equipment, in which they are submerged or lubricated with the liquid handled, are dealt with in a catalogue obtainable from Lucian Q. Moffitt, Inc., 333 S. Main Street, Akron, Ohio, national distributor of the bearings.

A bulletin containing the results of tests made by York Laboratories of Stamford, Conn., of different types of silicone water repellents for masonry walls is being offered by L. Sonneborn Sons, Inc., 404 Fourth Avenue, New York 16, N. Y. Inquiries should be sent to Department P-6, Building Products Division.

An illustrated bulletin describing Shear-Speed soluble oil is obtainable from Shear-Speed Chemical Products Division, Michigan Tool Company, 7125 E. McNichols Road, Detroit 12, Mich. A multiviscosity blend, the coolant-lubricant is suitable for both light and heavy metal-cutting, grinding and forming operations. Ask for Bulletin 5053.

An improved electronic adjustable-speed drive from ¾ to 3 hp to power small industrial equipment in place of mechanical gear boxes, clutches and variable-pitch cone pulleys is described and illustrated in a booklet offered by Reliance Electric & Engineering Company, 1111 Ivanhoe Road, Cleveland 10, Ohio. Write for Bulletin D-2102.

Niagara Machine & Tool Works, 637-697 Northland Avenue, Buffalo 11, N. Y., has announced the availability of Bulletin 58-L illustrating and describing its line of inclinable presses designed for light- to medium-tonnage work and equipped with mechanical sleeve clutches. Well illustrated, the 24-page book also gives full information about accessories such as a pneumatic tripping device for the clutch, air releasing brake for automatic feed, and pneumatic die cushions for drawing operations.

Froth Flotation, Industry and Chemical Applications, is the subject of a bulletin obtainable from Denver Equipment Company, Box 5268, Denver 17, Colo. Written by L. A. Roe, technical supervisor, Division of Ore Research, Jones & Laughlin Steel Corporation, it discusses, among other things, the separation of near colloidal-size particles from saturated brine; fractionation of fine clays; recovery of fossil resin from coal; and cleaning peas and wheat. Also suggests potential uses such as the recovery of oil and greases from machine operations and from steel and petroleum-refining wastes; purification of industrial sludge and waste waters, etc.

Proved in the laboratory and in the field, Donaldson Air Cleaners meet all the rigid requirements of air compressor applications. Practically all dust, including elusive "extra fines" is removed to reduce wear on compressor parts; and the oil-trapping upper condensing element reduces oil loss from cyclical "blow back" to a minimum.

Donaldson air compressor Air Cleaners are used extensively by leading manufacturers on units with a wide range of capacities. Write for specifications.

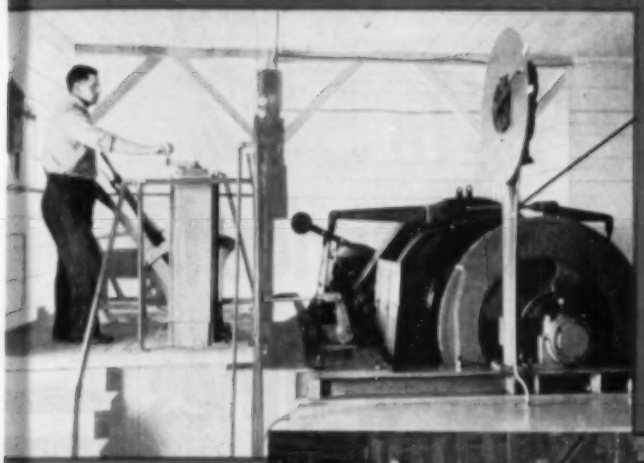
DONALDSON CO., INC.
666 Pelham Blvd., St. Paul 4, Minn.
DONALDSON CO. (Canada) LTD., Chatham, Ontario
GRINNELL DIVISION: Grinnell, Iowa

Donaldson AIR CLEANERS

ELECTRIC MINE HOISTS

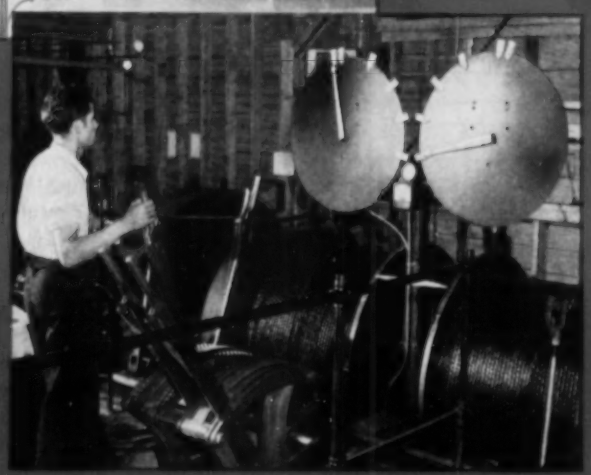
...by Canadian Ingersoll-Rand

. . . including a complete range of smaller units for shaft sinking, development and production.



Wherever you go, you find these sturdy smaller hoists at work. Like the larger hoists made by Canadian Ingersoll-Rand, every one of these smaller hoists is designed to meet a set of special requirements. This fact, plus Ingersoll-Rand's unique record of hoist engineering experience adds up to the safe, dependable hoist service famous among mining men all over Canada.

Call an Ingersoll-Rand man when you want to talk about hoists.



SOME FACTS ABOUT THESE SMALLER I-R HOISTS:

- *available in 30-inch to 60-inch drum diameters*
- *rope pulls of 5,000 to 14,000 pounds*
- *single or double drum machines with drum(s) keyed or clutched*
- *post-type main brakes on each drum with choice of brake lining material*
- *brakes and clutches operated by direct hand lever or fitted with either air or oil engine control*
- *brakes and clutches interlocked*
- *drums either plain or grooved*
- *gear-driven depth indicators*

Canadian Ingersoll-Rand Company Limited

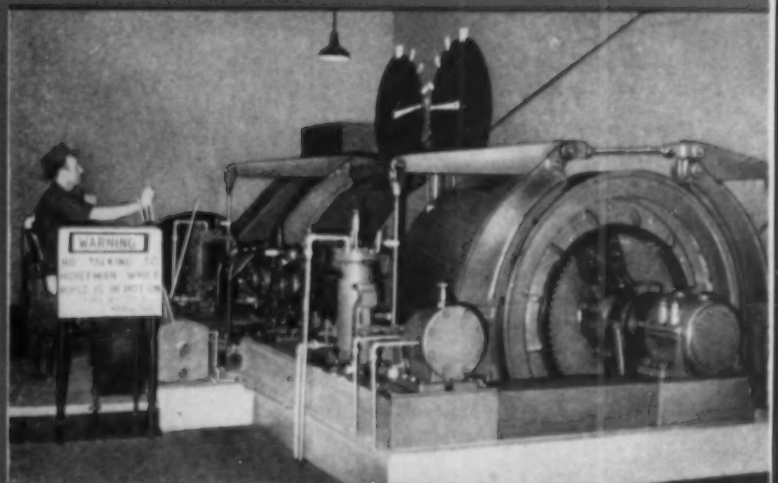
HEAD OFFICE-MONTREAL QUE. WORKS-SHERBROOKE QUE.

BRANCH OFFICES: SYDNEY SHERBROOKE MONTREAL TORONTO KIRKLAND LAKE TIMMINS SUDBURY CALGARY NELSON VANCOUVER

K-3

CANADA

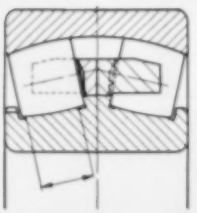
OVER 60 YEARS OF EXPERIENCE BUILT INTO EVERY HOIST



improvement of internal design
of spherical roller bearings

Increases capacity 25% to 50%

increases service life 2 to 3½ times

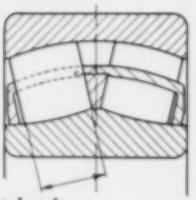


This is the Spherical Roller Bearing design originated by SKF *more than 30 years ago.* The cross-section shows how the integral inner ring flanges, and the undercuts adjacent thereto, limit the effective length of the rollers.

Now, SKF, originator of the Spherical Roller Bearing, has again provided industry with another anti-friction *first.*

This time, it's a revolutionary design advance in Series 222 and 223 bearings providing these advantages:

When designing new equipment, you can obtain the desired life by using smaller or lighter bearings at considerable cost saving. In addition, this forward step in design will carry heavier combinations of radial and thrust loads, or pure thrust loads of greater magnitude. The important self-aligning feature of SKF Spherical Roller Bearings has been preserved, so that considerable misalignment between the shaft and housing has no ill effect whatever on bearing capacity or life.



Here is the latest SKF improvement, a *revolutionary advance in design.* Effective roller guiding is accomplished by means of a separate ring. The need for undercuts is eliminated! This type of guide ring permits the rollers to take the position which their contact with the rings dictates. This assures uniform load distribution over the entire length of the longer rollers at all times. *Result*—greatly increased capacity and life.

During more than 4 years, thousands of installations have been made in railroad journals, vibrating screens, steel mill machinery and numerous other fields. In all cases performance has been outstanding.

SKF Sales Engineers in our District Offices throughout the country will assist you in making use of the important advantages of the improved internal design of SKF Spherical Roller Bearings. **SKF INDUSTRIES, INC.,** Dept. 616, PHILADELPHIA 32, PA. — *manufacturers of* **SKF** *and* HESS-BRIGHT *bearings.*

7424

This 12-page booklet gives you additional facts—sizes available—added capacity, size by size—increased life you can expect for each size—dimensional tabulations—and load and speed data. Write now for your free copy of Booklet No. 365-2.

SKF®
BALL AND ROLLER BEARINGS

© 1953, SKF INDUSTRIES, INC.,

Map shows the Cachuma Reservoir which will be formed by damming the Santa Ynez River. Crest of the mountain range is shown in center. South Coast Conduit will take water from Pacific end of tunnel to distribution centers.

6½-mile tunnel to bring water to thirsty Santa Barbara area

Because of a mountain barrier the Santa Ynez River in Southern California flows away from population centers, emptying each year its millions of gallons of water virtually unused into the Pacific. Meanwhile, the nearby Santa Barbara area, on the southern side of the Santa Ynez range, is suffering a water shortage.

To divert Santa Ynez water to where it is so urgently needed, the 6½-mile Tecolote Tunnel is being bored through the mountain, to tap water from a reservoir formed by the recently completed Cachuma Dam.

Begun in 1950, work on the tunnel has been pushed ahead through extremely tough strata despite frequent delays caused by subterranean water at the tunnel face.

Halverson Contractors, a combination of H. Halverson of Spokane and Carl M. Halverson of Portland, hold a $7 million contract with the U. S. Bureau of Reclamation for this project. Using both carbide-insert bits and single-use bits on rods of Bethlehem hollow drill steel, the contractors have advanced through a sedimentary formation, including some unusually tough shales and sandstones.

As in so many projects where drilling speed is a dominant factor, Bethlehem hollow drill steel has played a part in helping to keep Tecolote Tunnel drilling on schedule.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

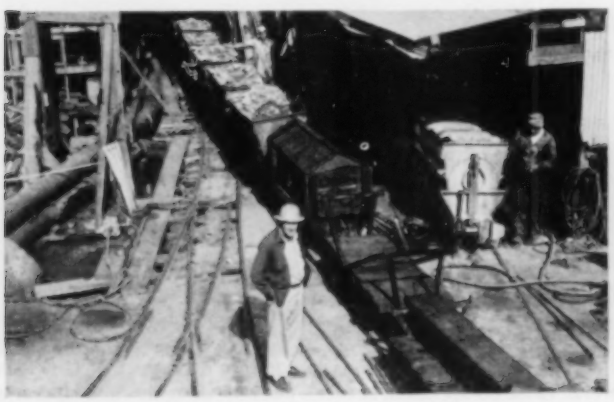
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Two Grades of

BETHLEHEM HOLLOW DRILL STEEL

- THE "OLD RELIABLE" CARBON TYPE
- ULTRA-ALLOY, OUR CHROME-MOLY GRADE



Tunnel Superintendent Oscar Peterson stands in foreground at the Pacific portal of Tecolote Tunnel as a trainload of muck emerges. The crews have advanced through a sedimentary formation unusually tough to penetrate and have blasted more than 80,000 cu yd.

The 7-ft-diam horseshoe bore is drilled with 6-ft rounds, every third round preceded by 30-in. test holes. Shown at tunnel face is a standard drill jumbo which mounts 3½-in. drifters. Halverson Contractors uses both carbide-insert and single-use bits on rods of Bethlehem Hollow.

1878 75 1953
YEARS OF ELECTRICAL PROGRESS

ONE OF FIVE 2000-HP G-E SYNCHRONOUS MOTORS USED FOR AIR-COMPRESSOR DRIVES AT FORD MOTOR CO., ROUGE PLANT.

FOUR REASONS WHY G-E SYNCHRONOUS MOTORS

1. STRONG, FABRICATED FRAMES . . .

The welded steel-plate stator frame provides maximum rigidity in a comparatively lightweight construction. The sturdy channel-shaped frame consists of a wrapper plate firmly secured by continuous welds to rigid side plates. This design, proved by years of operating experience, affords more than ample strength for clamping and supporting the stator core.

2. G-E BRUSHES ON G-E MOTORS . . .

Brushes on G-E synchronous motors are a product of G-E teamwork. Close co-operation between machine designers and laboratory engineers means you get the right brush on the right motor for your particular application. In addition to extensive research and testing, all new and improved grades of brushes are thoroughly field-tested before approved for standard use.

Dependable G-E Synchronous Motors on 24-Hour Assembly-line Service

Ford Motor Company uses G-E synchronous motors for air-compressor drives

Compressor-motor dependability is really put to test on 'round-the-clock service at Ford Motor Company's Rouge plant. Compressed air is used 24 hours a day on many assembly operations, and a dependable supply is vital to keep production lines moving.

To furnish this all-important air, five 2000-hp G-E synchronous motors drive reciprocating compressors continuously—with only slight reductions in demand on certain shifts.

G-E synchronous motors can be relied upon for such continuous service with minimum downtime. You can depend on them because in back of every G-E synchronous motor stand more than half a century of motor engineering leadership . . . superior research and testing facilities to assure excellent component materials . . . and a corps of experienced craftsmen who are proud of the equipment they build—and build it to last.

The next time you consider a drive for heavy, continuous-service equipment be sure to call in your G-E representative to discuss any special application problem you may have. Have him explain the many money-saving uses for G-E synchronous motors and point out their operating economies.

In the meantime, you can obtain more information on G-E synchronous motors by writing for these publications: GEA-5332, "Low-speed Synchronous Motors," or GEA-5426, "High-speed Synchronous Motors." Write to Section 770-29, General Electric Co., Schenectady 5, N. Y.

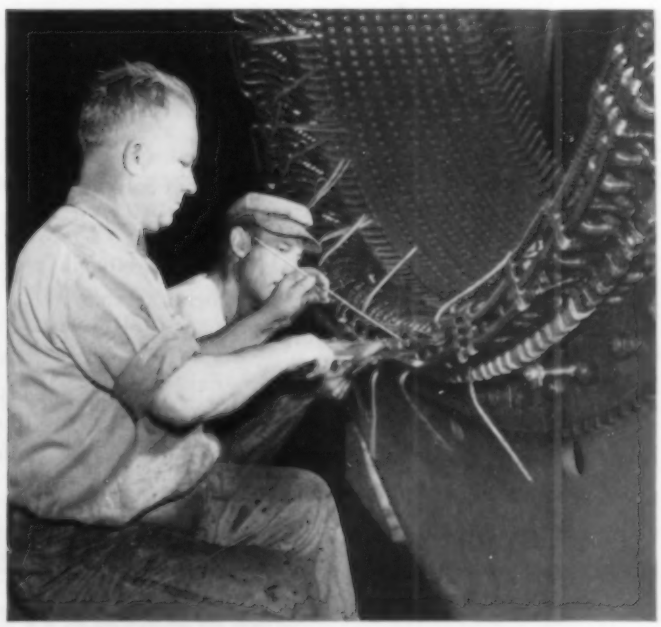
You can put your confidence in—

GENERAL ELECTRIC

GIVE LONG, DEPENDABLE SERVICE . . .

3. LONG INSULATION LIFE . . .

Insulating materials, manufactured in our own factories by the most modern methods, conform to rigid G-E specifications and are applied by experienced operators, above. Thus coils are uniform, interchangeable, mechanically rugged, and moisture resisting.

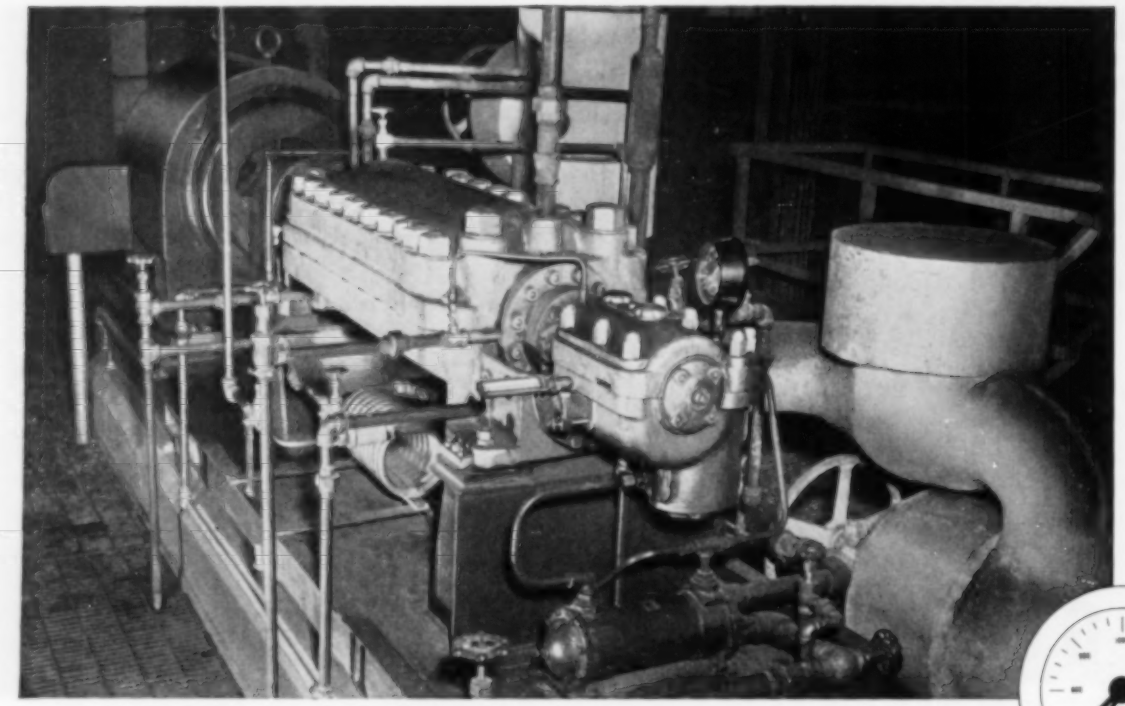


4. LOW-RESISTANCE CONNECTIONS . . .

For dependable operation, stator windings are silver brazed, as shown above. Joints of this type have low electrical resistance, exceptional thermal and mechanical strength. These important properties are difficult to obtain by other methods.

Modern design boiler-feed pumps, service-proved

AT ALCOA REFINING DIVISION



One of two 3" HMTA pumps on 1095 psi boiler feed service at this company's East St. Louis plant.

Ingersoll-Rand Class HMTA pumps aid in production of alumina, preparatory material for vital aluminum

This important ALCOA division refines bauxite ore into alumina to help keep ALCOA production facilities going full-tilt. This East St. Louis plant also produces some 50 other chemicals that are widely used throughout the country.

Aluminum Company of America's East St. Louis Works generates its total power requirements in its own powerhouse. Two Ingersoll-Rand 8-stage Class HMTA pumps are on boiler feed service there, delivering 300 gpm of 345° feed water at 1095 psi. When installed in 1951, these pumps were among the first of their type to go into service. Performance records since start-up indicate the reliability of their modern, "Unit-Type Rotor" design, pioneered by Ingersoll-Rand.

There's an I-R pump for every application, every pressure... backed by over 90 years of service to industry. Call on your nearest Ingersoll-Rand branch office for help with *your* pumping problems.

For more information on Class HMTA pumps, write for Catalog 7233.

Ingersoll-Rand
11 Broadway, New York 4, N. Y.

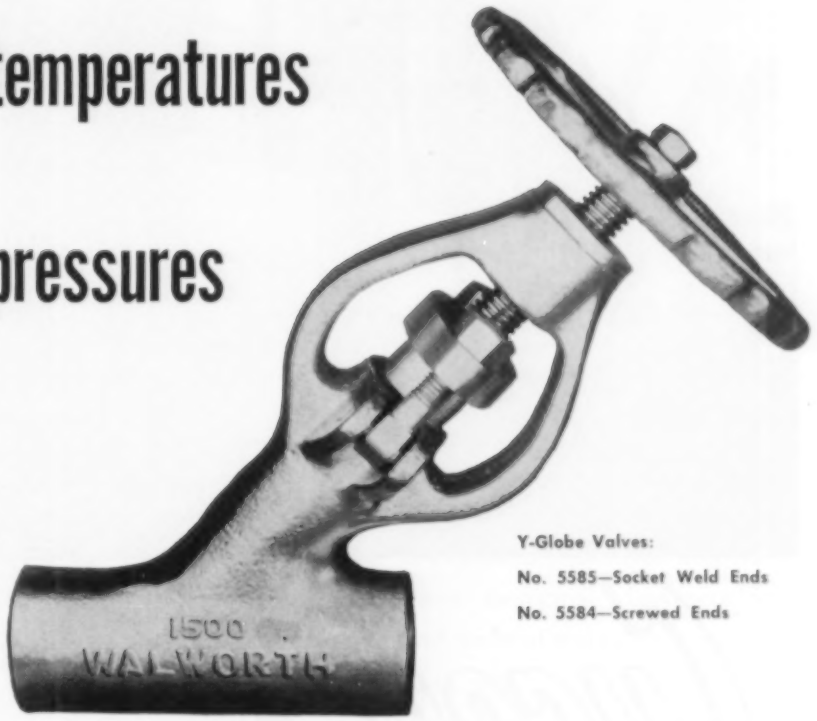
828-10

CONDENSERS • GAS AND DIESEL ENGINES • TURBO-BLOWERS • ROCK DRILLS • COMPRESSORS • AIR AND ELECTRIC TOOLS

Walworth's NEW small cast steel valves

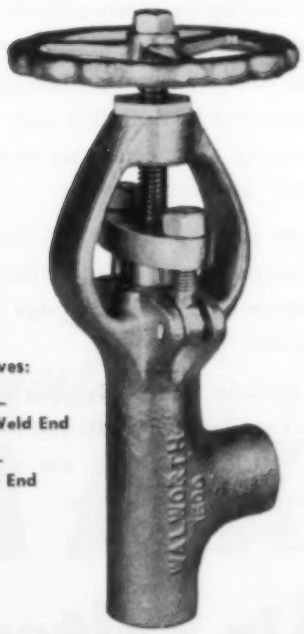
SERIES 1500 – SIZES ¼ to 2 inches

handle HIGH temperatures
HIGH pressures



Y-Globe Valves:
No. 5585—Socket Weld Ends
No. 5584—Screwed Ends

Walworth is proud to make these new Small Cast Steel Valves available to power stations . . . oil refineries . . . ships . . . wherever piping is subject to severe pressures and temperatures. Non-shock service ratings of these valves: 1500 psi–950F for steam; 3600 psi–100F for water, oil or gas. Cast of chromium molybdenum steel, they are compact and light, yet exceptionally strong. Both Y-Globe and Angle type valves are available.



Angle Valves:
No. 5587—
Socket Weld End
No. 5586—
Screwed End

Simplified Walworth design eliminates many of the valve problems encountered in high pressure service. Among the features of this new valve are:

INTEGRAL BODY AND YOKE – made from a single casting without threading or welding. Bonnet joint — always a potential source of leakage — is eliminated. Valves can be reassembled quickly and easily.

ROTATING DISC – prevents valve seat distortion and consequent leakage. Cuts down replacements.

WELDED SEAT RING – compensates for changes in pressure and temperature—eliminates a major source of leakage.

SPECIAL BACK SEAT BUSHING – permits repacking the valve under pressure with greater safety.

PACKING CHAMBER – designed to dissipate heat thus keeping packing rings at lower temperatures—gives them longer life.

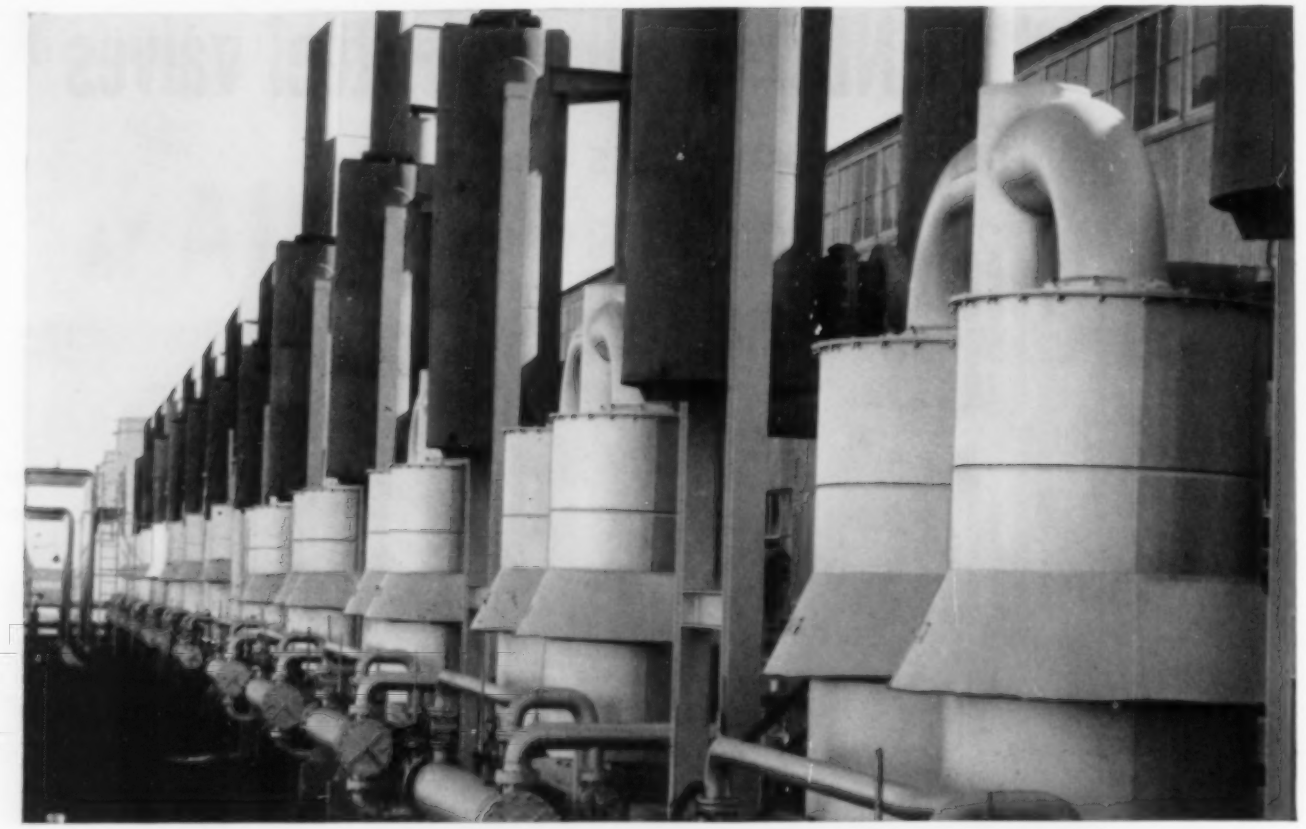
These valves are available with either socket weld ends or screwed ends, in sizes ranging from ¼ to 2 inches. For further information on Walworth series 1500 Small Cast Steel Valves, see your local Walworth distributor, or write for Circular No. 134.

WALWORTH

valves • fittings • pipe wrenches

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



Cycoil "lowers the boom" on DUST

Famous Oil Bath Air Cleaners Supply "Round the Clock" Protection For 17,750 Horsepower

Dust gets rough treatment at this Elk City, Okla. plant of Shell Petroleum. Standing guard at the air intake of each of 10 engines are two Cycoil Oil Bath Air Cleaners.

There's no compromise with perfection when Cycoil is on the job. It battles just as hard for the last particle of dust as the first. The plan of attack is simple, logical and highly effective. First, intake air is thoroughly mixed with oil which traps over 90% of the dust content. Second, final cleaning action is then taken over by dual filter pads which capture the remaining 10%, consisting mostly of those "hard to get" fine dust particles.

Yes, Cycoils deliver approximately 100% clean air. If you settle for less you merely delay the inevitable —costly engine down-time and repairs due to that 2% or 3% of dust that "got by".

Write for AAF Bulletin No. 130. It gives you the "inside" facts on Cycoil design—tells you why this Oil Bath Air Cleaner has become the accepted standard for complete dust protection.

AAF

American Air Filter

COMPANY, INC.

402 Central Avenue, Louisville 8, Kentucky • American Air Filter of Canada, Ltd., Montreal, P. Q

YOU'RE ALWAYS A GOOD NEIGHBOR---- WITH MAXIM SILENCERS

When horsepower has to work 24 hours a day in close proximity to residential and business areas, the best exhaust silencing you can get is just downright necessary.

That is one very good reason why public relations-conscious municipal plants from coast to coast choose Maxim Silencers.

Maxim Silencers are backed by longer manufacturing experience, more field use, and the broadest engineering and research background in acoustics available.

Because silencing needs vary so greatly, good engineering advice to start with is almost as important as the product. Maxim engineers know municipal plant problems, and can be of real assistance in planning efficient installations. They are at your service.

Consult **MAXIM**

THE MAXIM SILENCER COMPANY
61 Homestead Ave., Hartford 1, Connecticut

Gentlemen:
Please send me your bulletins on Exhaust and Intake Silencers.

NAME_____

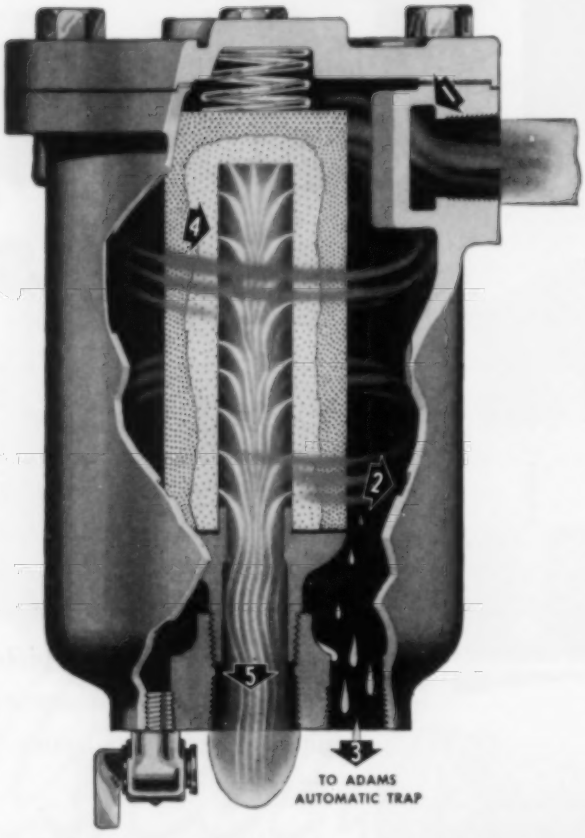
COMPANY_____

ADDRESS_____

_____

10MX53

ADAMS *has both* *



—— BOTH ANSWERS TO THE PROBLEM OF KEEPING WATER, WATER VAPOR, OIL AND DIRT OUT OF COMPRESSED AIR LINES

There's no *one* answer to this problem! The most expensive aftercooler you can buy will not remove scale that is picked up in the distribution lines. The most expensive air filter you can buy cannot guarantee removal of water vapor until it has been condensed by cooling. That's why Adams makes both.

* PORO-STONE *AIR FILTER*

1. Centrifugal separation of dirt and liquids.
2. Drainage to trap directed by vertical cast-in slots.
3. Continuous, fully automatic trap action.
4. Rapid diffusion and filtration through permanent, cleanable Poro-Stone.
5. Clean, dry air at practically unchanged pressure. Standard, stocked sizes handle from 10 to 700 cfm.

Easily installed in either vertical or horizontal pipe line.

* AFTERCOOLER AND CYCLONE SEPARATOR

Cools air to within a few degrees of cooling water, making certain that compressed air is colder than surrounding atmosphere, so that no further condensation can take place.

Counter flow, air-through-tube design assures continuously high heat transfer rate.

Double cyclonic action deposits all water and entrained oil in moisture chamber.

R. P. ADAMS CO., INC.
209 E. Park Drive, Buffalo 17, New York

Please send me your latest literature, Bulletin No. 176 on BOTH the Poro-Stone air filter and the Adams Aftercooler — Cyclone Separator.

Name .....

Company ..... *Title* .....

Address .....

City ..... *State* .....

FOR YOUR PROFIT'S SAKE —FIND OUT ABOUT BOTH

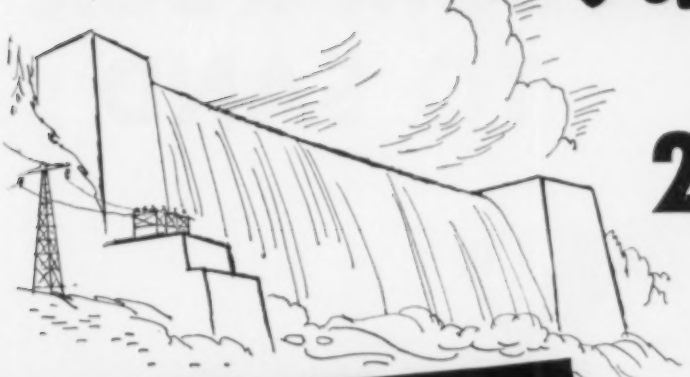
R. P. ADAMS CO., INC., BUFFALO 17, N. Y.

186,072,500

pounds of Tube-Ice

used in building

2 WESTERN DAMS*



Yes—that much ice was required to cool the concrete mix in order that it set properly to develop its ultimate strength for two outstanding dam structures.

The important part of this message to you is that the compact and readily portable Vogt Tube-Ice Machines pictured here set this record without even the replacement of a freezer tube. What's more, they are *ready to go again* whenever ice is needed in quantity.

Tube-Ice is widely used in process work and for preserving shipments of meat, fish, milk or vegetables . . . and is produced at the lowest possible cost per ton since a Tube-Ice unit occupies less space, has fewer parts, uses less power than any other method for making ice.

Tube-Ice Machines are available in sizes from 2000 lbs. per day up to any desired capacity. Send for free Bulletin TI-3.

**McNary Dam, Washington, and Pine Flats Dam, California, required a total of 2,730,000 cu. yds. of ice cooled concrete mix.*

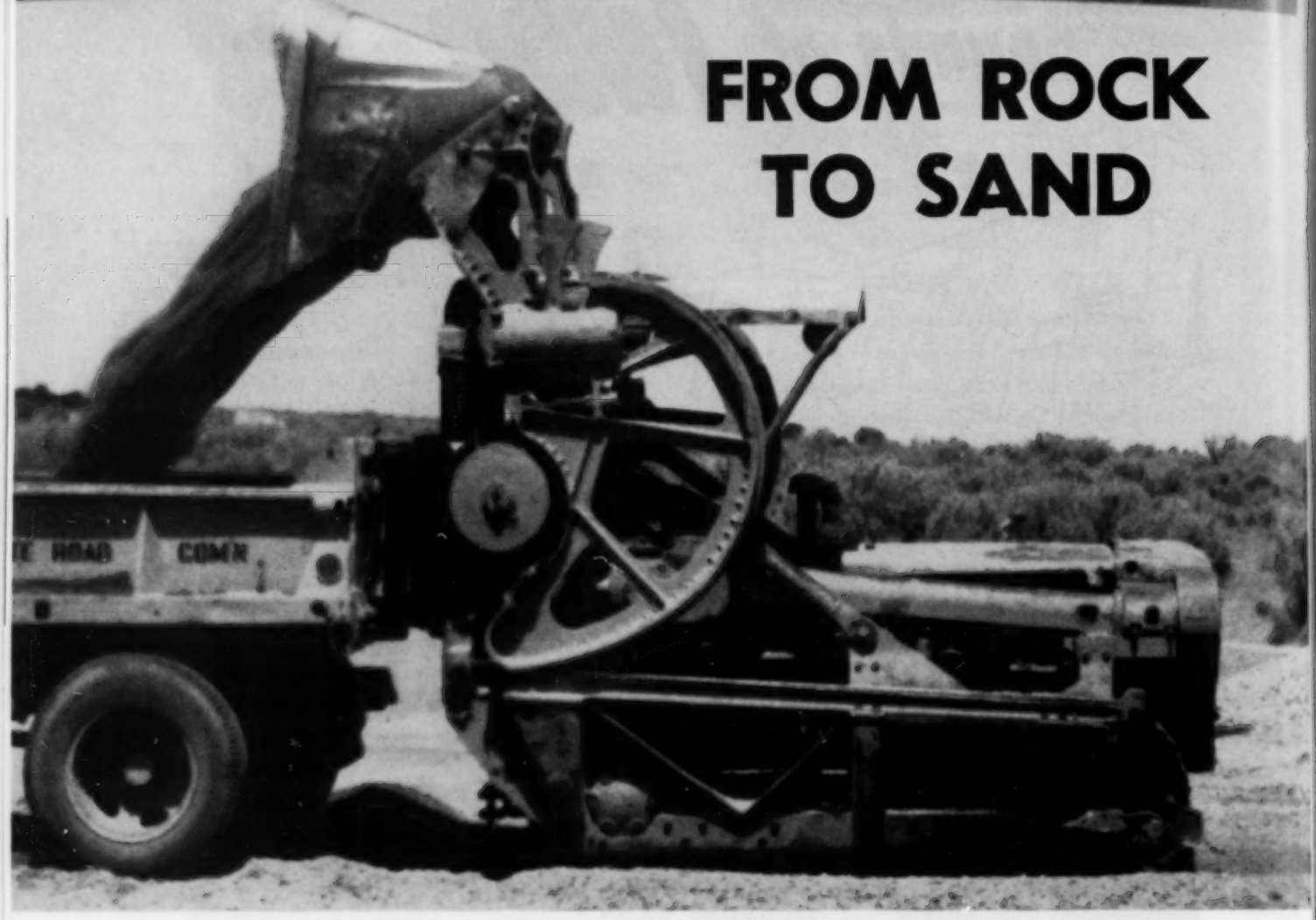
HENRY VOGT MACHINE CO.
LOUISVILLE 10, KENTUCKY

BRANCH OFFICES
New York, Philadelphia, Chicago, Cleveland,
St. Louis, Dallas, Charleston, W. Va.

Automatic

Vogt TUBE-ICE MACHINE

FROM ROCK TO SAND



Heavy loading jobs require Eimco machines designed and built for heavy work. Eimcos were built to load rock and stay on the heavy jobs where other equipment fails.

Rock digging and loading in blocky, abrasive ores underground or on the surface at the rate of three to four yards per minute is average. They run forward to dig and load — backward to discharge overhead.

Every job can use one or more Eimcos for stockpile loading, bulldozing, digging in narrow places, loading trucks, etc. They're ideal for highway clean-up jobs. They dig and load economically in rock, sand, gravel, sticky clays and other materials and discharge the bucket clean into trucks or railroad cars.

Write for information.

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

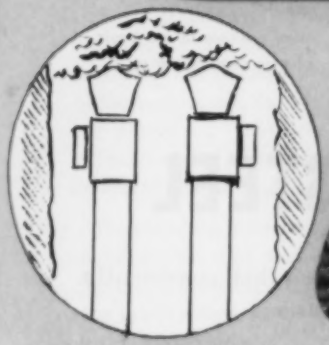
EXECUTIVE OFFICES AND FACTORIES — SALT LAKE CITY 10, UTAH, U. S. A.

BRANCH SALES AND SERVICE OFFICES:

NEW YORK, 51-52 SOUTH STREET • CHICAGO, 3319 SOUTH WALLACE STREET
BIRMINGHAM, ALA., 3140 FAYETTE AVE. • DULUTH, MINN., 216 E. SUPERIOR ST.
EL PASO, TEXAS, MILLS BUILDING • BERKELEY, CALIF., 637 CEDAR STREET
KELLOGG, IDAHO, 307 DIVISION ST. • LONDON W. 1, ENGLAND, 190 PICCADILLY

IN FRANCE: SOCIETE EIMCO, PARIS, FRANCE
IN ENGLAND: EIMCO (GREAT BRITAIN) LTD., LEEDS 12, ENGLAND
IN ITALY: EIMCO ITALIA, S.P.A., MILAN, ITALY

EIMCO — Dual-Control Loaders



Mining companies, operating their own schools of instruction have found that it is easier to teach with equipment prepared for dual operation.

Eimco offers its dual control machines for that purpose but they have also been found to be a practical tool for many operations underground:

Around curves where track has been laid close to one side of the crosscut, under hanging walls, working both ways from the shaft in a pitching vein. For safety in old workings—under chutes, or in bad ground, under piping or air vents and in double track systems.

Eimco Dual-Control units work equally well from either side providing usual outstanding performance of all Eimco air powered loading equipment.

EIMCO

1401

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

EXECUTIVE OFFICES AND FACTORIES – SALT LAKE CITY 10, UTAH, U. S. A.

BRANCH SALES AND SERVICE OFFICES:

NEW YORK, 51-52 SOUTH STREET • CHICAGO, 3319 SOUTH WALLACE STREET
BIRMINGHAM, ALA., 3140 FAYETTE AVE. • DULUTH, MINN., 216 E. SUPERIOR ST.
EL PASO, TEXAS, MILLS BUILDING • BERKELEY, CALIF., 637 CEDAR STREET
KELLOGG, IDAHO, 307 DIVISION ST. • LONDON W. 1, ENGLAND, 190 PICCADILLY

IN FRANCE: SOCIETE EIMCO, PARIS, FRANCE
IN ENGLAND: EIMCO (GREAT BRITAIN) LTD., LEEDS 12, ENGLAND
IN ITALY: EIMCO ITALIA, S.P.A., MILAN, ITALY

Here are two of our basic electric steel furnaces.

NATIONAL FORGE *ELECTRIC* STEEL

. . . is used exclusively in all of our forgings. This is to your distinct advantage when you have your forgings National-forged.

Electric Steel can be held to close chemical analysis; it is cleaner; it has lower sulphur and phosphorous content and is more uniform from heat to heat.

These qualities of our steel have enabled us to produce forgings for the armed forces that consistently meet their most exacting specifications.

Your forgings will receive the same meticulous care throughout. So why not have them National-forged next time? We offer our facilities and experience for your service; just write NATIONAL FORGE AND ORDNANCE CO., Irvine, Warren County, Penna.

NATIONAL FORGE AND ORDNANCE COMPANY

IRVINE, WARREN COUNTY, PENNSYLVANIA

Looking for solutions to all piston ring problems?

It will pay you to look to Koppers . . . here's why:

Every Diesel, gas engine, pump and compressor presents a different piston ring problem. So it pays to go to the source that can look for the solution from every angle . . . Koppers American Hammered!

In one complete, modern plant, American Hammered produces rings for every industrial application . . . in sizes ranging from less than one inch to ten feet in diameter. Ready to serve you are large foundries equipped for both static and centrifugal casting . . . a modern heat-treating plant . . . one of the largest and most up-to-date chromium plating plants . . . modern machine shops . . . an efficient engine test laboratory . . . a modern and complete piston ring research laboratory.

Outstanding product quality, assured by trained metallurgical and engineering staffs . . . supplemented by field engineers, thoroughly familiar with ring applications . . . results in efficient service and analysis of your specific problem. For experienced help with *your* problems, mail this coupon. No obligation, of course.

Compression Ring is a one-piece, quick-seating piston ring. One-piece construction gives maximum strength. Turned finish on outside diameter enables ring to conform readily to cylinder bore. Chemically treated surfaces promote rapid seating with freedom from scuffing or scoring during run-in. ½" to 120" diameters.

Porous Chromium Plated piston rings are manufactured by the exclusive Van der Horst process. Produced with a shallow porosity on the cylinder contacting surface, this ring facilitates break-in, holds and distributes oil during this critical period. Lasts four times longer and cuts cylinder wear up to 75%. ½" to 42" diameters.

Conformable Oil Ring maintains constant unit pressure for positive oil control. Conforms readily to meet cylinder distortion because flexible cast iron member is pressed outward by abutment type spring which exerts uniform radial pressure around entire circumference. 4" to 25" diameters, ¼" min. width.

Koppers Seal Ring has either one of two projecting bands of bearing bronze inserted in its cylinder contacting face. High unit pressure on narrow bronze bands takes quick initial seat, tends to prevent blow-by in both new or worn cylinders. Burnishing action of bronze on cylinder walls decreases scuffing and wear. 2" to 30" diameters.

Grooved Oil Cutter Ring has been adapted as standard equipment where oil control has previously been a major problem. Unique design incorporates two bevels for riding over oil on upstroke, plus a series of wide drainage slots. 1½" to 25" diameters.

Plus Ring Materials to fit every need, such as: K-IRON®, a high grade, closely controlled, individually cast grey iron used in majority of applications . . . and K-SPUN®, a malleable type iron, centrifugally cast for applications requiring high strength, high elastic modulus and superior impact resistance.

AMERICAN HAMMERED

Industrial Piston Rings

IN EVERY SIZE
OF EVERY TYPE
FOR EVERY PURPOSE

METAL PRODUCTS DIVISION • KOPPERS COMPANY, INCORPORATED • BALTIMORE 3, MD.

This Koppers Division also supplies industry with Fast's Couplings, Aeromaster Fans, Koppers-Electrostatic Precipitators and Gas Apparatus.

KOPPERS ®

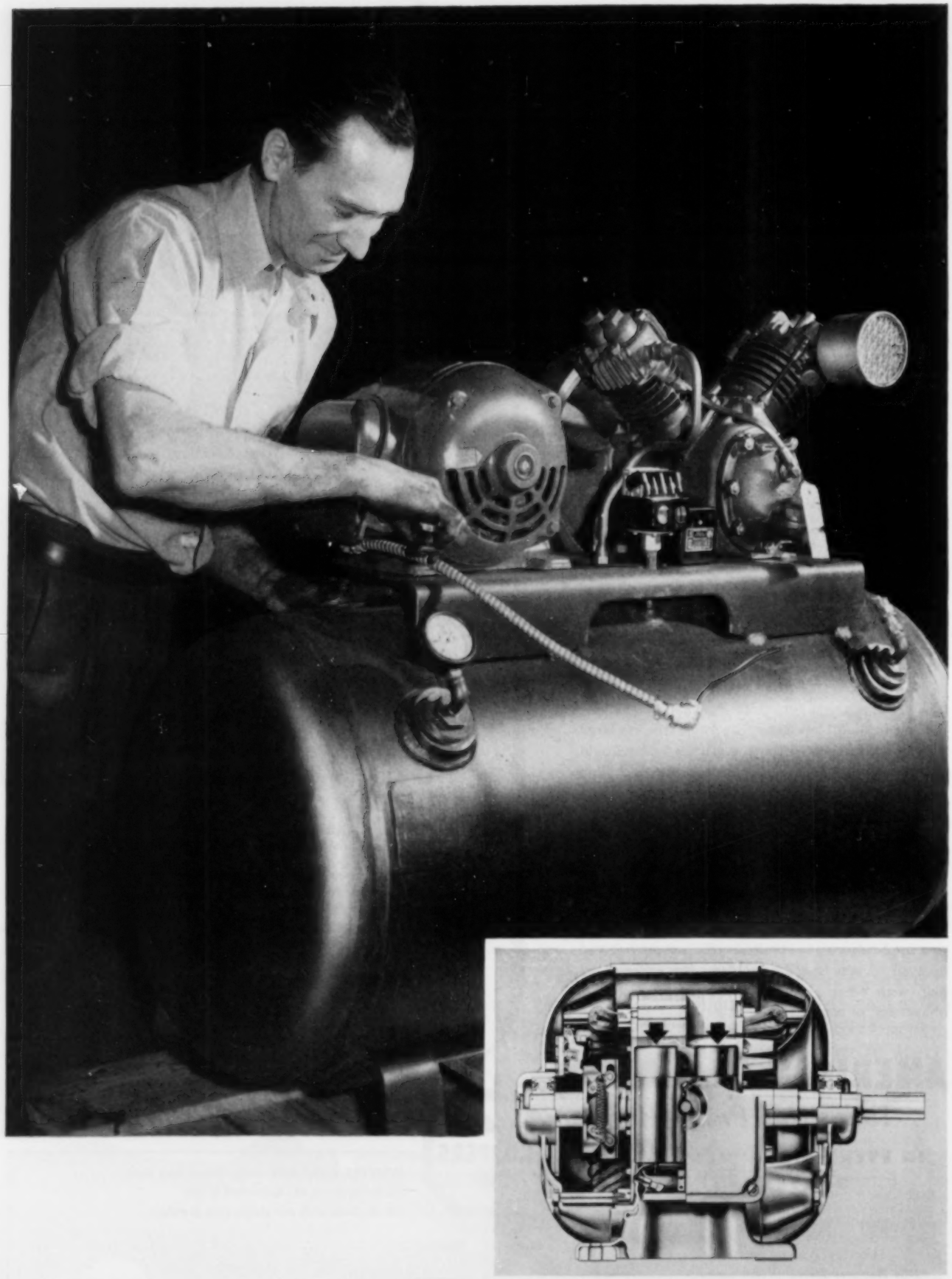
KOPPERS COMPANY, INC., *Piston Ring Dept.*
1610 Hamburg St., Baltimore 3, Md.
I'd like help with my piston ring problem.

Name .....

Company .....

Address .....

City ..... **State** .....



Built-in capacitors supply out-of-phase power to provide ample torque for starting underload, without creating an overload. One to 3-hp ratings are equipped with starting capacitors; starting and running capacitors are provided on 5 and 7½-hp ratings.

Tough "compressor tests" spot breakaway torque...prove *Life-Line* capacitor motor dependability

Can you think of a tougher test for a single-phase motor than meeting the varying demands of this small air compressor? Westinghouse engineers reproduced in these tests the tough field conditions that demand high torque—staying power and wear resistance. Here's what they proved:

Starting Torque Test

At near freezing temperatures, a 1½-hp CAP motor met the full load demand of the compressor with greater breakaway torque than other commonly used types of single-phase motors. As a result, the CAP motor reached full motor torque more quickly.

As room temperature for this test was dropped to 33° F, compressor oil turned heavy—sticky with friction. When power surged into the CAP motor, it kicked over the compressor and reached full motor torque in 7½ revolutions. Other types of single-phase motors in the test required 12 revolutions.

Endurance Test

After several hours operation at full overload capacity, Life-Line* CAP motors show no signs of overheating. Heat transfer from the coil windings is improved by the pear-shaped design of the stator slot. It gives uniform seating to the coil eliminating air pockets that hold heat.

Wear-Resistance Test

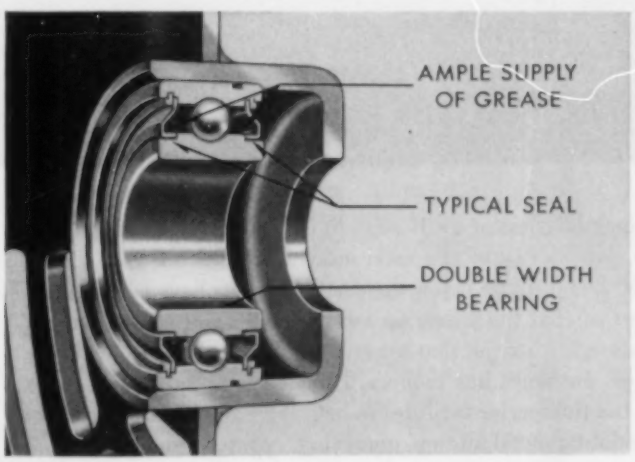
Hours of starting and stopping every five minutes resulted in no apparent wearing of CAP motor parts. The motor's simple, die-cast, squirrel-cage rotor has no brushes or rings to require maintenance. Life-Line pre-lubricated ball bearings afford trouble-free, and lubrication-free operation for the life of the motor.

Tested and proved on thousands of jobs, the CAP motor brings you, in one compact unit greater torque and operating dependability. For further information on CAP motor ask your local Westinghouse representative for booklet B-5441, or write to Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania. J-21779

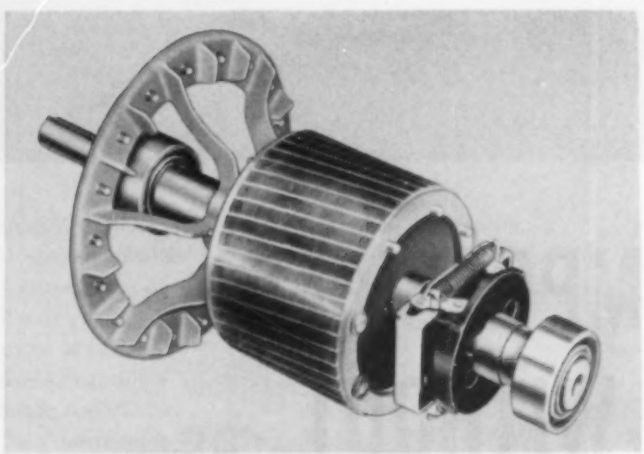
*Trade-Mark

YOU CAN BE SURE... IF IT'S

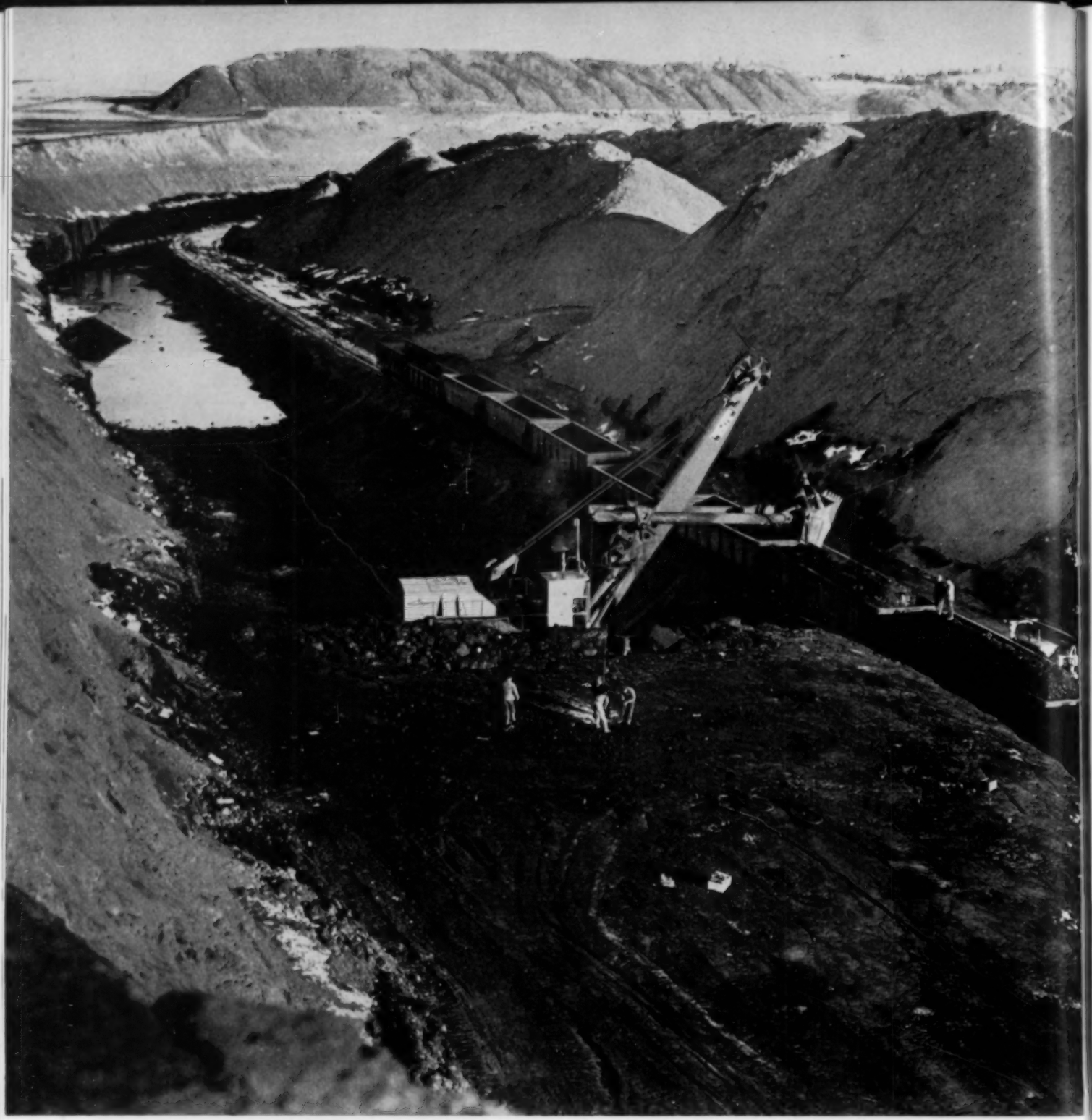
Westinghouse



Pre-lubricated bearings do away with greasing schedules and problems. Lubrication costs are reduced to zero. Bearings are factory packed and sealed, with a special lubricant to inhibit oxidation and deterioration. Dirt is sealed out... grease stays in.



Die-cast rotor is a simple squirrel-cage type. It is dynamically balanced for freedom from vibration. It has no commutator to wear or brushes to adjust or replace. Accompanying rocker arm and short-circuiter mechanism are eliminated.



IMPOSSIBLE WITHOUT EXPLOSIVES

During 1953, stripping operations will account for some 120 million tons of coal, or close to one-quarter of the total annual production. In extreme cases, deposits 150 feet or more below the earth's surface have been mined. For every five feet of coal thickness, an average of 39 feet of overburden first has to be removed. It's a job that never could be handled economically without explosives. Hercules has pioneered in developing the right types of explosives and has the service facilities to help solve any blasting problem concerning coal mining, metal mining, quarrying, construction, petroleum.

HERCULES POWDER COMPANY
INCORPORATED

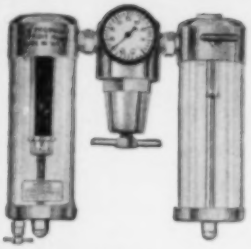
Explosives Department, 932 King St., Wilmington 99, Del.

Birmingham, Ala.; Chicago, Ill.; Duluth, Minn.; Hazleton, Pa.; Joplin, Mo.; Los Angeles, Cal.; New York, N. Y.; Pittsburgh, Pa.; Salt Lake City, Utah; San Francisco, Cal.

XR53-5

Prominent User Acclaims

"M-B" Automatic Air Line FILTER, REGULATOR and LUBRICATOR Assembly



The value of "M-B" Automatic Air Line Filters, Regulators and Lubricators is widely known for their effectiveness as a protection to Air Valves, Cylinders, Pneumatic Tools, etc.

"Your 'Sentinel of the Air Line' has been giving us very good service. We have had no complaints at all and I trust that we will be ordering more of them in the near future."

signed: **A. E. Cranston, Sr.**
PRESIDENT

Cranston Steel Strapping Co.
Oak Grove, Oregon

WRITE FOR LITERATURE

M·B PRODUCTS
46 Victor Ave.
DETROIT 3, MICHIGAN

CUT Cooling Water Consumption 50% —increase compressor efficiency

Schramm water-cooled, stationary air compressors, as shown, are equipped with Sarco rigid stem cooling controls, type TR-44R, as a recommended accessory.

These controls cut the water consumption to what is actually needed to protect the compressor.

They prevent impaired lubrication, often the result of overcooling. They are installed directly in the water piping, take up no extra space—require no attention. A Sarco strainer is installed ahead of the control valve.

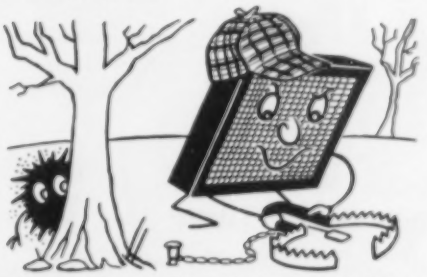
Write for Technical Bulletin No. 5 to *Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.* *Advt. 614*

As advertised in TIME, NEWSWEEK and BUSINESS WEEK

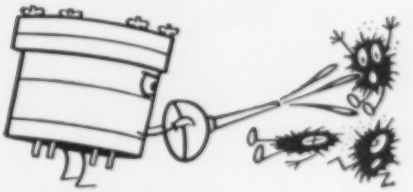
AIR-MAZING FACTS

BY O. SOGLOW

DUST DEADLY AS BACTERIA. Certain types of dust are extremely harmful to human beings. Quartz dust, for example, can sometimes lead to diseases such as silicosis, cancer and tuberculosis.



TRAPS DUST! Air-Maze air filter panels keep troublesome dust out of hotels, railroad cars, commercial and industrial buildings. Cleaning bills are cut, employees and customers are happier. Air-Maze filter panels are easily cleaned, have high dirt-holding capacity.



STOPS DUST WITH OIL! Air-Maze oil bath filters literally "scrub" intake air in a pool of oil. Used on large diesel engines and air compressors, they keep damaging dust and dirt from moving parts.

WHETHER YOU BUILD OR USE engines, compressors, air-conditioning or ventilating equipment, *or any device using air or liquids* —the chances are there is an Air-Maze filter *engineered* to serve you better. Representatives in all principal cities. For condensed product catalog write Air-Maze Corporation, Cleveland 28, Ohio.

AIR-MAZE
The Filter Engineers

AIR FILTERS
SILENCERS
SPARK ARRESTERS
LIQUID FILTERS
OIL SEPARATORS
GREASE FILTERS

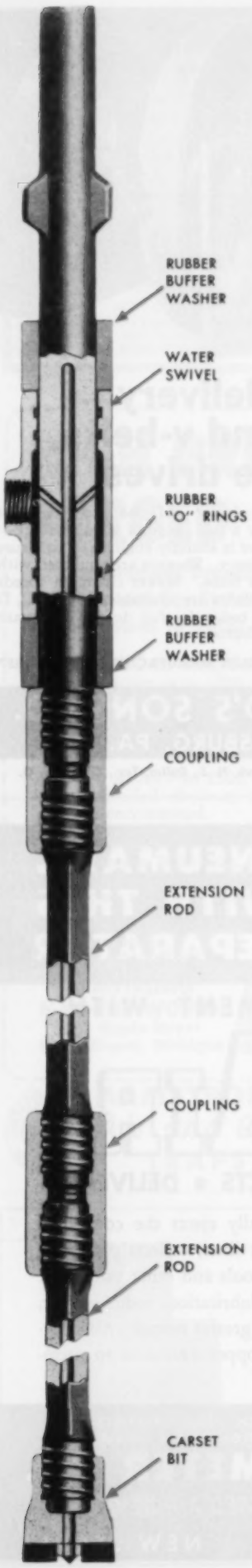
Wire Rope at Work — Perhaps the most unusual building of our time is the State Fair Arena at the State Fair Grounds, Raleigh, N. C., shown here while construction was in progress. Startling in design, this steel-and-concrete structure is some 300 ft long by 300 ft wide, with sides that rise gracefully in perfect arcs. But its most striking feature is the gently-curved roof, which is supported entirely by Bethlehem steel cables.

Forming a grid with 6-ft x 6-ft squares, the cables, zinc-coated for resistance to corrosion, are securely anchored to the framework of the building and are fastened together at points of intersection. Bolt-clipped to the grid are corrugated metal sheets which, with the topping, constitute the roof proper. This ingenious application of steel cable—a member of Bethlehem's wire rope family—has already aroused wide interest and may well suggest a new trend in design and construction.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:

MINING • CONSTRUCTION • PETROLEUM • EXCAVATING • QUARRYING • LOGGING • MANUFACTURING



Everything you need for

LONG HOLE DRILLING

WITH

Carset Jackbits

Holes up to 100 feet deep are now being drilled faster and at much lower cost by this I-R Carset method

The longer-lasting, faster-drilling Carset Jackbit, with practically no gauge wear, has revolutionized deep hole drilling with I-R Drifters and coupled steels. The Carset method is not only much faster, but less costly than when using diamond drills. No special training is needed and the work can be done by regular miners with a minimum of supervision.

To permit the most efficient deep hole drilling with I-R Drifters and Carset bits, Ingersoll-Rand has developed and perfected a *complete line* of accessory equipment—including a water swivel that feeds hole cleaning air and water at high pressure directly into the drill steel without going thru the drill—a rugged, long-lasting coupling with the same threads as the bits—and extra-strong alloy steel extension rods.

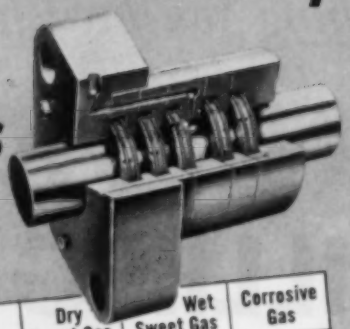
This combination of equipment, shown at the left, has proved remarkably successful in a host of deep-hole drilling applications. Ask your nearest I-R representative for the complete story. He can supply *everything you need*—from the bit all the way back to the compressor.

Ingersoll-Rand
11 BROADWAY, NEW YORK 4, N. Y.

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS
CENTRIFUGAL PUMPS • DIESEL AND GAS ENGINES

954-15

ONE source for every packing need-*it's* COOK

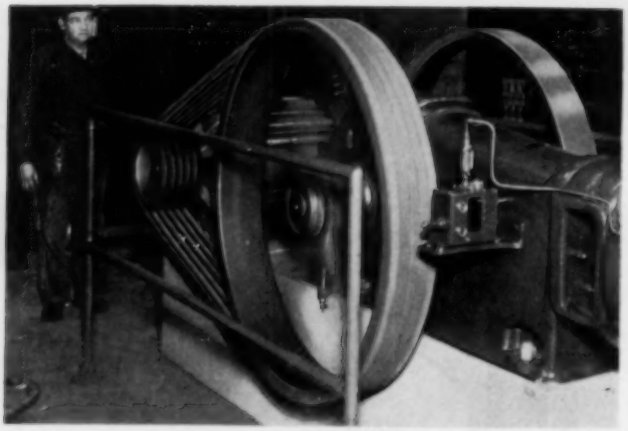


MATERIAL	Dry Sweet Gas	Wet Sweet Gas	Corrosive Gas
Cook Graphitic Iron	X	X	
Cook Graphitic Iron Tinized	X	X	
Cookmet (Plastic Bronze)	X	X	
Cook Babbitt		X	X
Cookroc (Bakelite)			X
Graphitized Cookroc (Bakelite)			X
Hi-Temp Cookroc (Bakelite)			X

Prompt deliveries of Cook packings and rings in any style can be made for any standard compressor. Engineering cooperation is always available without obligation.

WRITE FOR CATALOG NO. 440 AND FULL DETAILS

C. LEE COOK MFG. CO.
INCORPORATED
Dept. 1, LOUISVILLE 3, KY.



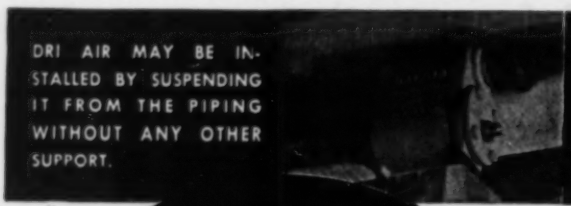
immediate delivery— sheaves and v-belts, complete drives

Ready to install a complete drive? Maybe you need just sheaves or V-belts! We carry a full range of sizes in stock—ready to send out. Every drive is soundly engineered to insure long belt life and utmost efficiency. Sheaves are equipped with "Sure—Grip" interchangeable hubs. Makes changing speeds easier—quicker. Sheaves and belts are available in A, B, C, D and E grove sections. Write today for full details or consult your Wood's Industrial Distributor.

MECHANICAL POWER TRANSMISSION MANUFACTURERS SINCE 1857

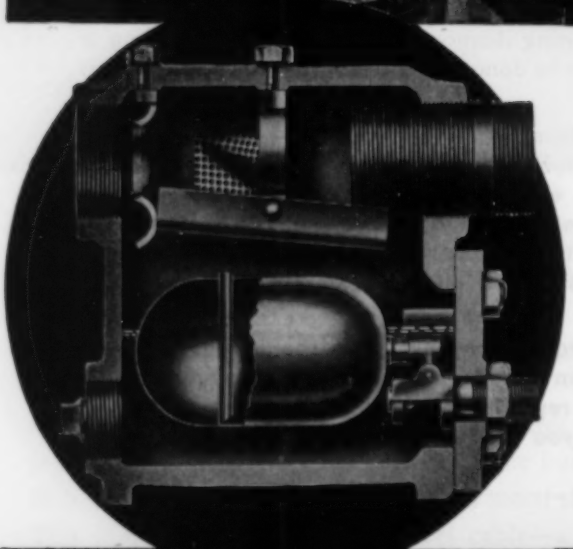
T. B. WOOD'S SONS CO.
CHAMBERSBURG, PA.

Branches: Cambridge, Mass., Newark, N. J., Dallas, Tex., Cleveland, O.



DRI AIR MAY BE INSTALLED BY SUSPENDING IT FROM THE PIPING WITHOUT ANY OTHER SUPPORT.

INCREASED PNEUMATIC EFFICIENCY WITH THIS AUTOMATIC SEPARATOR



PROTECT EQUIPMENT WITH

DRIAIR

SEPARATES • COLLECTS • DELIVERS

• DriAir separates and automatically ejects the condensed water and oil from compressed air lines, collects pipe scale and rust, delivers clean dry air to tools and other pneumatic equipment. This promotes better lubrication, reduces wear, increases life of tools and produces greater output. All internal parts are made of bronze or copper—resistant to corrosion and practically permanent.

A TYPICAL INSTALLATION SHOWING DRI AIR STANDING ON A CONCRETE FLOOR NEXT TO THE WALL.

WRITE FOR BULLETIN DA WHICH FULLY DESCRIBES THE CONSTRUCTION AND OPERATION OF THE DRIAIR.

NEW JERSEY METER CO.
"SPECIALISTS IN COMPRESSED AIR DEVICES"
PLAINFIELD, NEW JERSEY

BEARIUM METAL

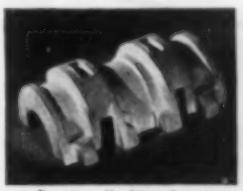
PROVED BY YEARS OF USE IN THOUSANDS OF APPLICATIONS

For more than 25 years—in applications ranging from motion picture projectors to bulldozers—the amazing properties of **BEARIUM METAL** have greatly reduced operating costs and solved countless frictional problems everywhere.

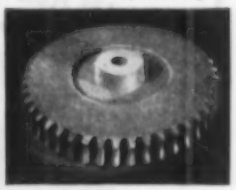
Non-seizing and non-scoring—even should lubrication completely fail—**BEARIUM METAL** provides not only every desirable quality found in other bearing alloys, but possesses features in addition that are exclusive.

The Ultimate Development for Bearing Services

Bearium Pump Bearing



Bearium Turbine Bearing



Bearium Worm Wheel

Write for full information on this amazingly different bearing bronze.

BEARIUM METALS CORP.

270 State St. ROCHESTER 14, N. Y.

WEST COAST AFFILIATE:
Nevin Engineering Associates
932 Chautauqua Blvd.
Pacific Palisades, Calif.

IN CANADA:
Bearium Metals of Canada, Ltd.
155 George St.
Toronto 2, Canada

HIGH PRESSURE FORGED TRAPS

for Automatic Drainage of Air and Gas Systems at Pressures to 2000 lbs.

1. BALL FLOAT TRAPS

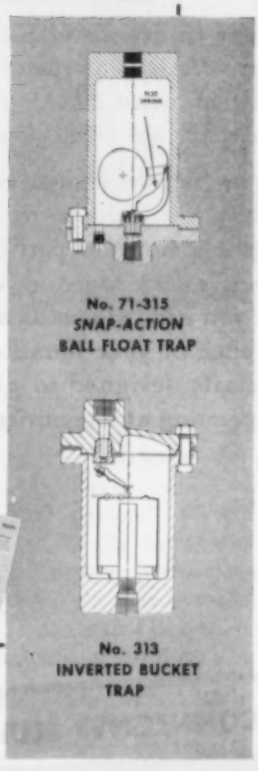
a. *Snap-Action*—to 1000 psig. Spring-powered valve snaps open and closed. No hunting or dribbling. Not held open by fine dirt.

b. *Direct Action*—to 1500 psig. Recommended where no oil or dirt are encountered.

2. INVERTED BUCKET TRAPS—pressures to 2000 psig. None more dependable—not adversely affected by dirt or heavy oil.

Submit your problem for detailed recommendation.
ASK FOR BULLETIN 2021.

ARMSTRONG MACHINE WORKS
885 Maple Street
Three Rivers, Michigan



No. 71-315
SNAP-ACTION
BALL FLOAT TRAP

No. 313
INVERTED BUCKET TRAP

ARMSTRONG *Air and Gas* **TRAPS**

Only
SAUERMAN OFFERS ALL THESE LONG RANGE MACHINES

Sauerman Scraper stores and reclaims 150,000 tons of stone on space between dock and cement mill.

Sauerman earthmoving machines have been providing efficient, economical materials handling for over 40 years. Moderate in initial investment, they are equally adapted to a wide variety of applications, including bulk and waste material haulage, stockpiling and storage. One man operation, plus long life and low maintenance, insure low cost per cubic yard handled.

DRAG SCRAPER STOCKPILER — Stores and reclaims bulk materials, such as coal, gravel, sand, sugar, ore, and a variety of chemical products. Equally adaptable both indoors and out.

DRAG SCRAPER EXCAVATOR — An economical machine for excavation, reclamation and handling of materials, wet or dry. A rapid conveyor for long range hauling. Bucket sizes 1/3 to 15 cu. yds.

SLACKLINE CABLEWAY EXCAVATOR — Unexcelled for operations that require delivery to a high point. Lifts its load to the top of the plant thirty to forty times an hour.

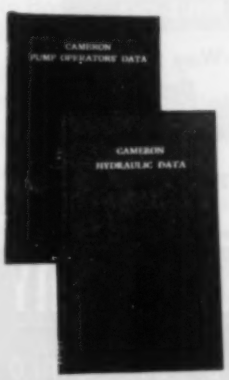
Sauerman has the size and type machine to do your job. Write for illustrated catalogs. Sauerman Bros., Inc., 548 S. Clinton St., Chicago 7, Ill.

SAUERMAN BROS., Inc.

TWO HANDY REFERENCE BOOKS

for

THE ENGINEER, THE SUPERINTENDENT, THE OPERATING MAN



CAMERON PUMP OPERATORS' DATA (Second Edition): Contains practical information covering the installation, operation and maintenance of centrifugal pumps.

CAMERON HYDRAULIC DATA (Twelfth Edition): Covers data useful in work involving the handling of liquids, steam, and water vapors.

Cameron Pump Operator's Data $2.00
Cameron Hydraulic Data $3.00

Both books can be obtained at the combination price of $4.50.

COMPRESSED AIR MAGAZINE, 942 MEMORIAL PARKWAY
Phillipsburg, New Jersey, U.S.A.

HANSEN REPRESENTATIVES
Quick-Connective Couplings
Are Their Business
BUT SO ARE FLUID LINE PROBLEMS

For the help you need—when you need it

KNOW YOUR HANSEN REPRESENTATIVE

E. C. WILD
E. C. Wild Company, Denver
Supplies pneumatic and hydraulic equipment to practically every type industry in the Rocky Mountain Area.

LEO J. SCHINDLER
Leo J. Schindler Company, Dallas
Offers engineering experience in proper application of pneumatic and hydraulic equipment to industries in Texas and Okla.

From years of on-the-job experience with practically every type of air line hook-up, the Hansen representative knows what works—and why it does. Frequently, when you run into trouble, he can quickly suggest the remedy to clear up your difficulties.

That's why in dozens of plants, it's almost routine procedure to call him whenever they need help in a hurry—either when actual troubles arise—or when air line circuits are being planned or altered.

The main job of the Hansen representative, of course, is to supply you with exactly the right quick-connective couplings for your particular requirements. But, as so many maintenance men already know, he can also give you real help on such matters as proper take-off, the pitch of your lines, location of drains, and other details designed to give you a trouble-free circuit operating at top efficiency.

REPRESENTATIVES

BALTIMORE	DETROIT	NEWARK
BIRMINGHAM	FT. WAYNE	NEW ORLEANS
BUFFALO	HARTFORD	PHILADELPHIA
CHICAGO	KANSAS CITY	PITTSBURGH
CLEVELAND	LOS ANGELES	SAN FRANCISCO
DALLAS	LOUISVILLE	SAVANNAH
DAYTON	MILWAUKEE	SEATTLE
DENVER	MINNEAPOLIS	ST. LOUIS

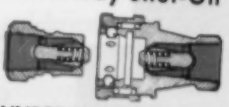
MONTREAL • TORONTO • VANCOUVER
Export Department: Cleveland

QUICK-CONNECTIVE FLUID LINE COUPLINGS

1. QUICK CONNECTION AND DISCONNECTION
2. INSTANT AUTOMATIC FLOW OR SHUT-OFF

One-Way Shut-Off

Two-Way Shut-Off



ALSO STRAIGHT-THROUGH QUICK-CONNECTIVE COUPLINGS
Send for Catalog!

THE HANSEN MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 11, OHIO

THE ONLY MODERN FRONT END ... ON QUARRY SHOVELS

110-B, 4½ cu. yd.
150-B, 6 cu. yd.
190-B, 8 cu. yd.

Convertible Shovels — Draglines

THE new Bucyrus-Erie Ward Leonard electric shovels bring to quarry loading the first important departure from the old-fashioned shovel front end. This advanced design — with two-section boom, inside tubular handle, and quiet positive rope crowd — increases speed and payload. It reduces upper boom weight, puts extra strength in the lower section where maximum strength is needed. It cuts out old-style handle racking and crowd pinions, takes the deadweight of crowd machinery off the boom. And, most important to *you*, it gives you all these field-proven performance advantages:

- **Lighter Weight, Greater Strength** — Two-section boom, with light upper section . . . lower section strut-connected to the A-frame.
- **No Handle Twist** — Inside tubular dipper handle is free to rotate in rubber-cushioned saddle block.
- **No Handle Binding in Saddle Block** — Rope crowd is quiet, positive, eliminates handle racking and crowd pinions.
- **No Dipper Wobble** — Twin dual hoist ropes put hoist power where needed for steady travel of dipper through bank.
- **No Sway Braces** — Widespread boom feet eliminate accessory boom braces or cables.
- **Low Swing Loads** — Advanced front end design, with crowd machinery on deck, cuts dead load on swing, steps up swing speed.
- **High Pay Loads** — Single tubular handle — with improved dipper back connections, dipper trip on saddle block, no dipper bail — reduces dead load on hoist, leaves more power for digging. 31L53C

There's much more to the story, too. Deck machinery, electrical equipment, and mounting all match the front end in advanced engineering and outstanding performance advantages. The full story will convince you that yard for yard, dollar for dollar, pound for pound, these are the finest rock excavators ever built.

Write for Complete Information Today!

BUCYRUS ERIE

BUCYRUS-ERIE COMPANY SOUTH MILWAUKEE, WISCONSIN

stop vibration before it starts

with a FLUOR pulsation dampening piping system

A Fluor Pulsation Dampening Piping System smooths out the "puffs" created by reciprocating action of compressors. It eliminates one of the chief causes of piping vibrations. A smooth, steady gas flow incurs less frictional resistance and reduces line breakage due to pipe fatigue. Without dampeners there is no alternate solution: *no matter how well pipe is anchored, the basic pulsations remain* – to cause problems with metering accuracy and plant safety.

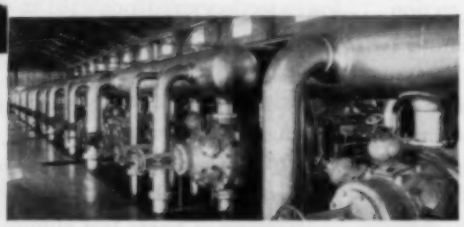
For new construction, Fluor supplies the complete piping system, prefabricated, ready for installation. Pulsation dampening is designed right into the basic compressor system through an engineered selection of bottles, headers and laterals. *It is built in, not added on.* And it costs little more than a conventional system because it eliminates expensive pipe anchoring and allows the design of related equipment based on a system free of pulsative flow.

For existing construction, Fluor's two "package-type" Pulsation Dampeners, in both manifold and in-line types, are easily installed in existing plants with an excessive vibration problem. The Fundamental Dampener minimizes objectionable pulsations while providing the continuous advantages of low pressure drop and less stress on piping, heat exchangers and vessels. The High Frequency Dampeners are supplied where pulse frequencies are in the range of the second harmonic or higher.

Fluor Pulsation Dampening Piping System built into new compressor station assures accurate metering.

Fluor's Mobile Research Laboratory

Manned by capable engineers experienced in the phenomena of sound and vibration, Fluor's Mobile Research Lab is fully equipped to conduct on-the-spot tests to determine the source, extent and best means of eradicating plant piping vibration.



Fluor Pulsation Dampeners curb vibration caused by reciprocating action of compressors.

Before you build, investigate Fluor Pulsation Dampeners and Piping System. Write for Bulletin PDS-8501.

BE SURE WITH **FLUOR**

THE FLUOR CORPORATION, LTD.
LOS ANGELES 22, CALIFORNIA

FOREIGN: FACTS-FLUOR · PARIS
FLUOR OF CANADA · TORONTO
FLUOR INTERNATIONAL · BEIRUT
FLUOR PERUANA, S.A. · LIMA
HEAD WRIGHTSON · LONDON

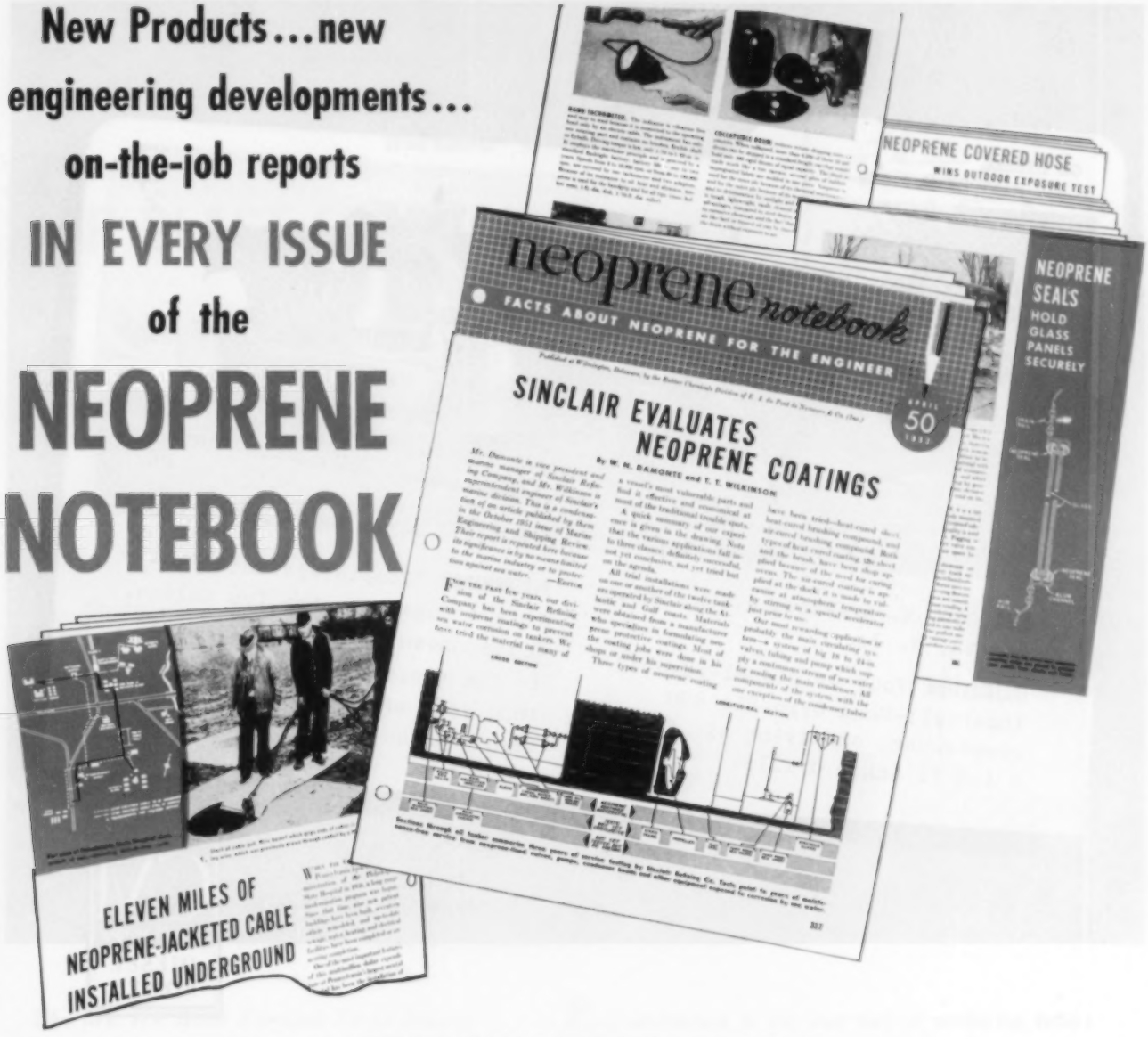
ENGINEERS
CONSTRUCTORS
MANUFACTURERS

NEW YORK
CHICAGO
PHILADELPHIA
BOSTON
PITTSBURGH
SAN FRANCISCO
HOUSTON
BIRMINGHAM
TULSA

New Products...new engineering developments... on-the-job reports

IN EVERY ISSUE of the

NEOPRENE NOTEBOOK


NEOPRENE COVERED HOSE
WINS OUTDOOR EXPOSURE TEST
neoprene notebook
FACTS ABOUT NEOPRENE FOR THE ENGINEER
SINCLAIR EVALUATES NEOPRENE COATINGS
NEOPRENE SEALS HOLD GLASS PANELS SECURELY
ELEVEN MILES OF NEOPRENE-JACKETED CABLE INSTALLED UNDERGROUND

YOU'LL FIND profitable reading in every issue of the Neoprene Notebook.

Informative, up-to-the-minute articles report on neoprene's performance in products ranging from oil seals to conveyor belts . . . from motor mounts to work gloves. These engineering facts about neoprene are illustrated by specific data, pictures, and drawings.

Designers and design engineers find the Neoprene Notebook gives them ideas on how to use this versatile chemical rubber in designing a new product or improving an old one. Plant operating and maintenance engineers rely on the Notebook to bring them experiences of others who have solved production and maintenance problems with long-lasting neoprene products.

You can be sure to receive the Neoprene Notebook regularly by mailing this coupon today!

NEOPRENE

The rubber made by Du Pont since 1932

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Rubber Chemicals Division CA-10
Wilmington 98, Delaware

I am interested in receiving the Neoprene Notebook regularly.

Name_____

Position_____

Firm_____

Address_____

GM DIESEL
CASE HISTORY No. 639-51

USER: Geo. M. Brewster & Son, Inc., Bogota, N. J.

INSTALLATION: Four GM Diesel-powered Ingersoll-Rand Gyro-Flo 600 compressors supplying air for 9 I-R 71 wagon drills.

PERFORMANCE: "Completely satisfactory," says operator Tom Malone. Units shown were delivering air to the tools through 1200 to 1600 feet of line--maintaining steady pressure of 100 to 110 psi.

It pays to STANDARDIZE on

GM
GENERAL MOTORS
DIESEL
POWER

2400 CUBIC FEET OF AIR PER MINUTE ON NEW YORK THRUWAY ROCK CUT

Geo. M. Brewster & Son now operate a total of 18 General Motors Diesel-powered Gyro-Flo compressors, including this battery of four capable of supplying 2400 cubic feet of air per minute for rock drills on a section of the New York Thruway, near Kingston.

These modern rotary compressors take full advantage of GM Diesel's smoother-running 2-cycle operation to maintain a steady flow of nonpulsating air at 100 psi or better. And compactness of the GM 2-cycle design makes these units smaller and lighter for quick, easy movement from job to job.

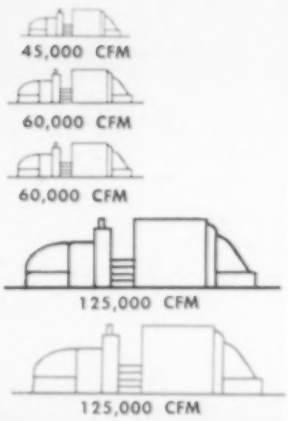
This inherent engine design superiority—plus interchangeability of lower-cost parts, readily available through a world-wide GM Diesel service organization—explains why GM Diesel power is a favorite of contractors on so many jobs. Next time you order equipment, it will pay you to specify GM Diesel. Available as original or replacement power in more than 750 different models of equipment. Write us for complete list.

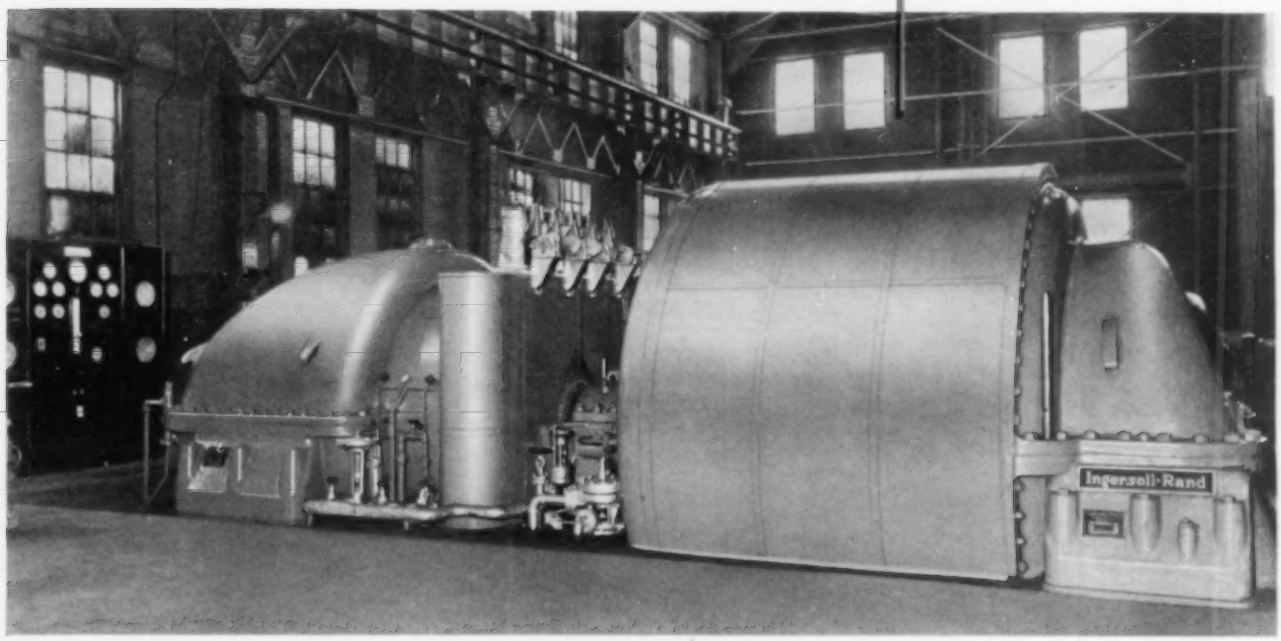
DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines . . . 16 to 275 H.P. Multiple Units . . . Up to 840 H.P.

Youngstown Sheet and Tube Company installs ITS FIFTH

I-R BLAST-FURNACE BLOWER

at Indiana Harbor Plant





The first I-R Blast Furnace Turbo-Blower installed at Indiana Harbor is still in daily service after 36 years of operation.

Six additional Blast Furnace Blowers in other Youngstown Sheet and Tube Co. plants bring the total to 11 units representing 760,000 cfm capacity.

PAST EXPERIENCE is one sure way of predicting future performance.

That's why the Youngstown Sheet and Tube Company continues to select I-R blast furnace turbo-blowers with *complete confidence* in their ability to give years of continuous, trouble-free service. For this steel company knows what I-R blowers can do – based on 36 years of actual operating experience. The first I-R blast furnace blower at the Indiana Harbor plant was installed in 1917 – and it's still on the job today.

The last two I-R Turbo-Blowers installed at Indiana Harbor, each rated 125,000 cfm, 35 psi discharge, are served by Ingersoll-Rand condensers, condensate pumps and circulating water pumps. Other Ingersoll-Rand equipment includes air compressors for plant air supply, instrument air and soot blowing, boiler-feed pumps and many other pumping units for miscellaneous plant service.

For proved *dependability* in steel mill equipment, it pays to specify Ingersoll-Rand. Your nearest I-R representative will be glad to discuss your requirements.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

978-12

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • OIL AND GAS ENGINES

Large compressor, little maintenance...
Reason: *TIMKEN® bearings*

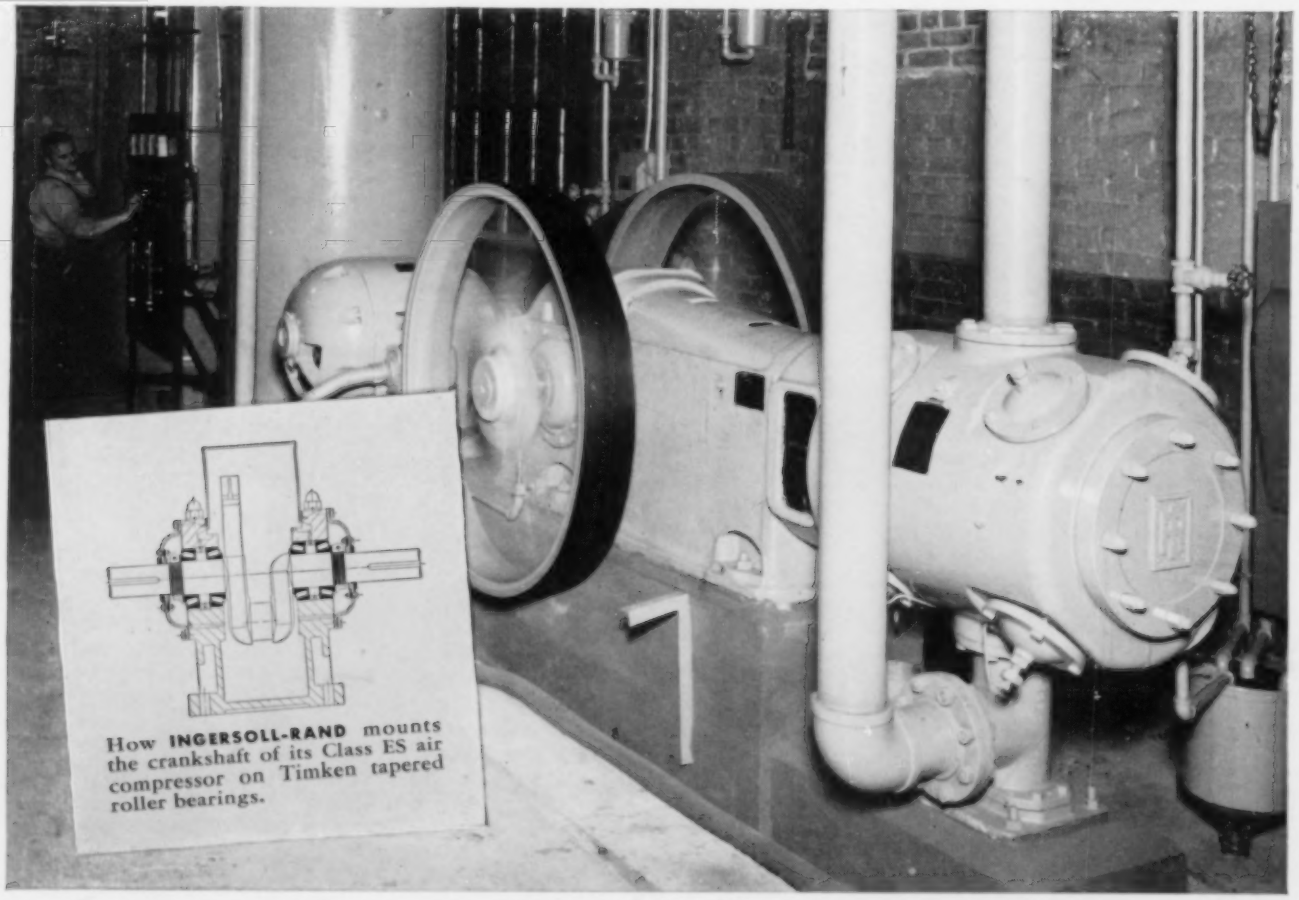
THIS big Ingersoll-Rand Class ES compressor supplies air needed to make parts used in super-precision instruments and airplanes. With Timken tapered roller bearings on the crankshaft, air supply is steady, maintenance costs are low.

By mounting the crankshaft on Timken bearings, crankshaft wear is eliminated. Timken bearings take radial and thrust loads in any combination. The crankshaft is held in positive alignment, wear on adjacent parts is reduced.

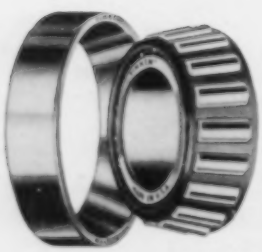
The Timken bearings hold housings and shafts concentric, making closures more effective. Dirt and moisture are kept out while lubricant is kept in. Lubrication and maintenance costs are minimized.

Backed by over half a century of bearing research, Timken tapered roller bearings are first choice throughout industry. Make sure you specify them for the equipment you build or buy. Look for the trademark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



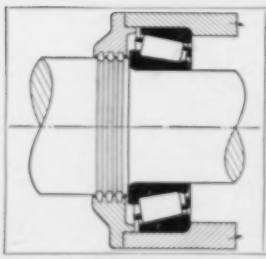
How **INGERSOLL-RAND** mounts the crankshaft of its Class ES air compressor on Timken tapered roller bearings.



TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



LUBRICANT STAYS IN —DIRT KEPT OUT

Because Timken bearings hold shafts concentric with housings, closures are made more effective. Lubricant is retained, dirt and moisture kept out.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis Timken steels.

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◫ AND THRUST ◫ LOADS OR ANY COMBINATION ◫